AD-A184 394 ARMY TRAINING STUDY: CONCEPTS OF THE ARMY TRAINING SYSTEM(U) ARMY TRAINING AND DOCTRINE COMMAND FORT MONROE VA F J BROWN 08 AUG 78 SBI-AD-F000 102 1/5

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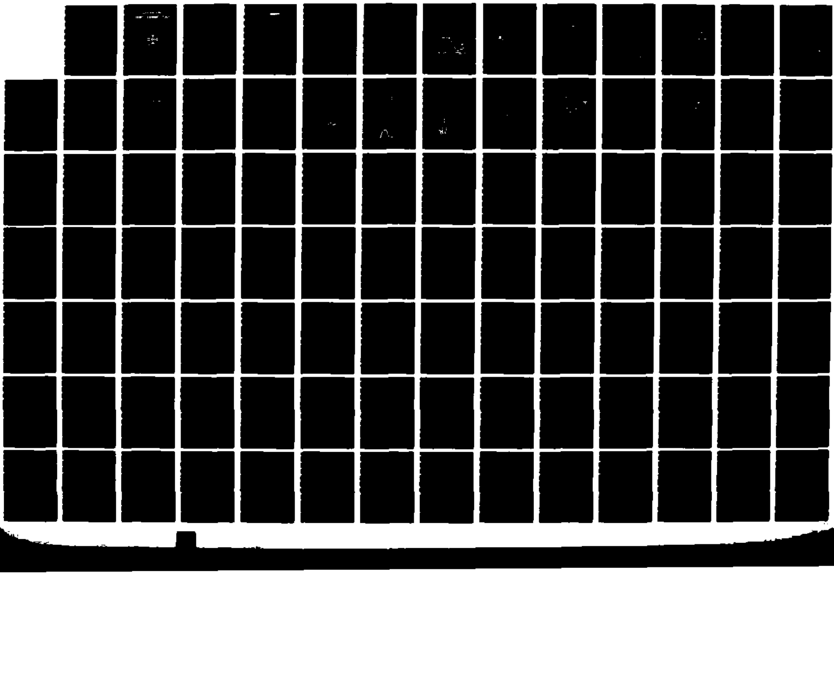

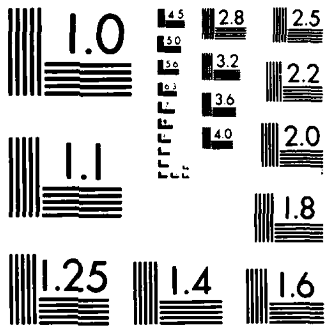
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~~DRAFT REPORT OF THE STUDY GROUP~~

ARMY TRAINING STUDY

CONCEPTS OF THE ARMY TRAINING SYSTEM

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CONCEPTS OF THE

ARMY TRAINING SYSTEM

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SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188
Exp Date Jun 30, 1986

1a REPORT SECURITY CLASSIFICATION Unclassified	1b RESTRICTIVE MARKINGS None
2a SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for Public Release; Distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4 PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION U.S. Army Training Study Study Group — 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION U.S. Army training and Doctrine Command Deputy Chief of Staff for Training
6c. ADDRESS (City, State, and ZIP Code) Fort Monroe, VA 23651-5000	7b. ADDRESS (City, State, and ZIP Code) Fort Monroe, VA 23651-5000
8a. NAME OF FUNDING/SPONSORING ORGANIZATION — 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO / TASK NO / WORK UNIT ACCESSION NO

11. TITLE (Include Security Classification)
The Army Training Study. Concepts of the Army Training System.

12 PERSONAL AUTHOR(S)
Brigadier General Frederic J. Brown III, et al

13a. TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Final Report	FROM ______ TO ______	1978, August 8	437

16 SUPPLEMENTARY NOTATION

17 COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Army Training System, Battalion training Model (BTM), Training Effectiveness Analysis (TEA).

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

The Army Training Study (ARTS Study) conducted a comprehensive overview of Army training. The research probed across a wide range of training issues as the study group sought a broad perspective of army training. The study group conducted field surveys at numerous continental US Army posts and schools. The data obtained was analyzed using the Training Effectiveness Analysis (TEA).

The concepts of the Army Training System volume describes the Army Training System Model (the ARTS Model), developed by the study group, which was constructed based on a combination of ideas about what army training is and ought to be. This volume describes a conceptual training system.

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	21 ABSTRACT SECURITY CLASSIFICATION Unclassified
22a NAME OF RESPONSIBLE INDIVIDUAL Thad M Gol	22b TELEPHONE (Include Area Code) 727-4337 — 22c OFFICE SYMBOL ATTG-B

DD FORM 1473, 84 MAR — 83 APR edition may be used until exhausted. All other editions are obsolete

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CONCEPTS OF THE

ARMY TRAINING SYSTEM

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AN ARMY TRAINING SYSTEM

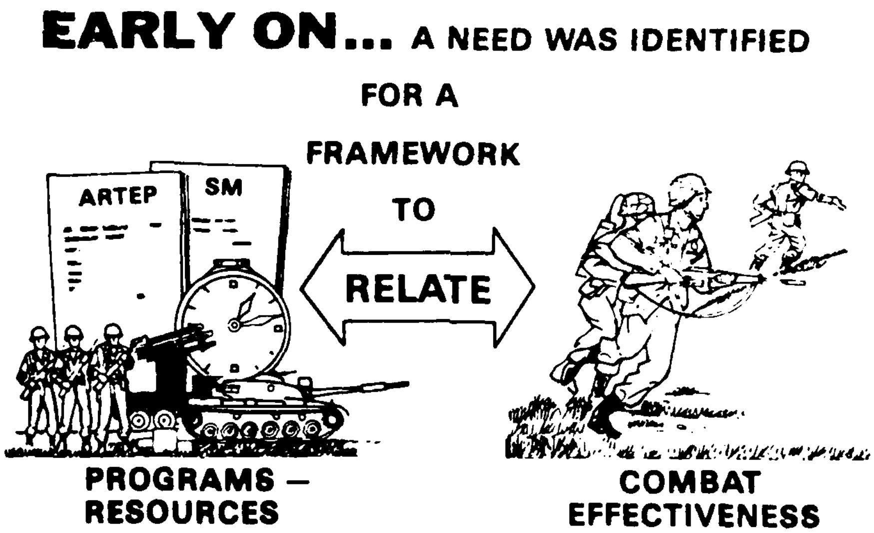
PURPOSE

The purpose of this paper is to describe a conceptual approach to an Army Training System developed by members of the Army Training Study (ARTS).

In describing this conceptual approach--the ARTS Model--the reader will be introduced to an interrelated training system described in detail by six ARTS research concept papers.

ANALYSIS FRAMEWORK

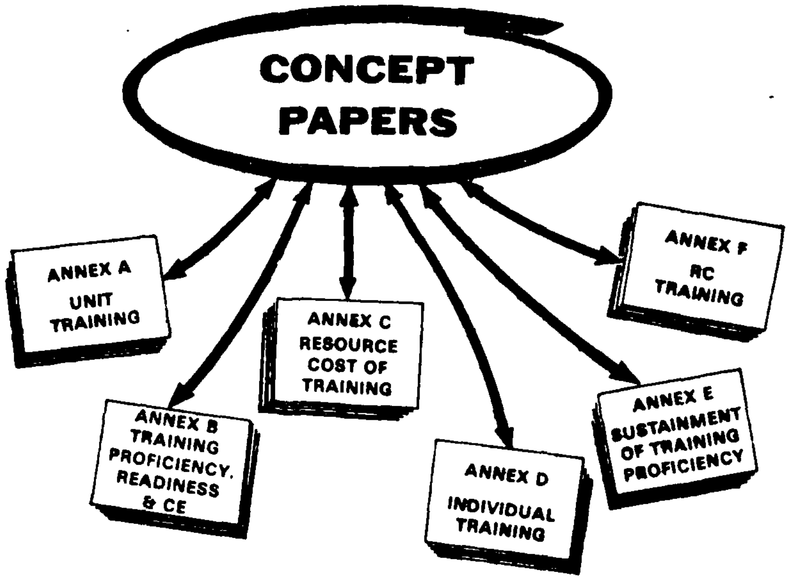
During the very early stages of the ARTS, a need was identified for a framework which could be used to relate the different training programs and resources which impact on readiness and combat effectiveness.



The requirement seemed clear--to develop an analytical vehicle to evaluate these critical elements of the ARTS Model so as to determine their functions and interrelationships. This, in turn, should assist in the better justification of current and future training resources, and establish a common framework of analysis for an Army Training System designed to support a level of combat effectiveness sufficient to deter and defeat any enemy.

CONCEPT PAPERS

Initial research into elements of the model was accomplished in concept papers prepared both to educate members of the study group in the complexities of the training system, and to outline in some detail a broad, conceptual framework within which specific training policy proposals or observations could be made.



Because these papers form an integral part of the ARTS analysis, they are included in the Concepts Volume (Annexes A to F), and are summarized below:

(1) Unit Training Programs (Annex A) examines the history, theory, and environment of unit training, both individual and collective, and presents a concept for more efficient unit training.

(2) Training Proficiency, Readiness and Combat Effectiveness (Annex B) discusses the relationship between proficiency and readiness, and establishes the need to measure training proficiency as a means of determining the Army's actual combat effectiveness.

(3) Resource Cost of Training (Annex C) proposes a uniform methodology for costing training readiness. The methodology equates the levels of training readiness to specific resource requirements.

(4) Individual Training (Annex D) examines the total individual training system, including policies, programs, and subprograms which impact on the conduct of individual training, primarily that within the training base.

(5) Sustainment of Training Proficiency (Annex E) examines military skill retention. This paper also presents a brief review of research and theories for both learning and forgetting, followed by a discussion of

generally accepted principles which have normally resulted in better learning, increased retention, and accelerated relearning.

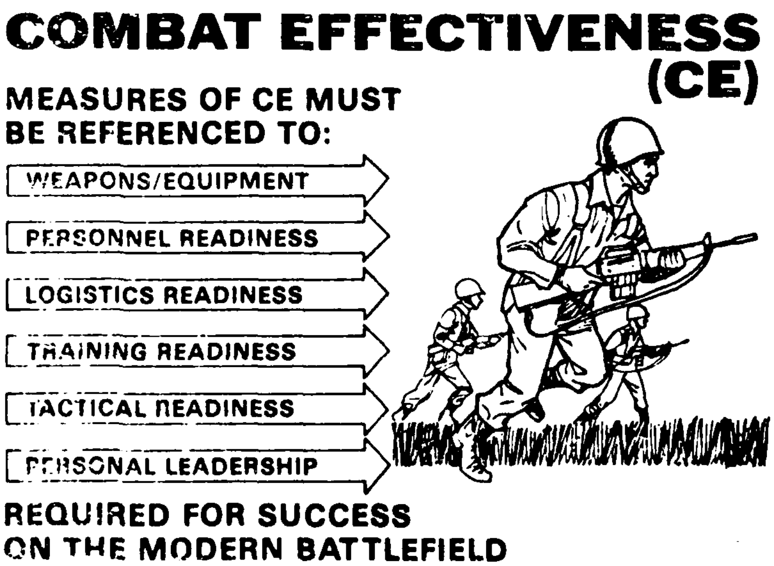
(6) Reserve Component Training (Annex F) develops issues involving our "citizen" Army, and discusses training lessons learned from previous mobilizations. This paper reviews the Reserve Component training environment and outlines alternatives to bridge the gap between peacetime and wartime roles of Reserve Components and their requirements and capabilities.

ARMY TRAINING STUDY MODEL

The ARTS Model of the Army Training System describes critical relationships which link resource inputs to combat effectiveness outputs.

DEFINITION OF COMBAT EFFECTIVENESS

The goal of the training system is to produce combat-effective units. Therefore, focus of the model must be on combat effectiveness (CE) which is the ability to accomplish tasks with appropriate conservation of resources within a reasonable time. It is the capability of the full range of units, from those directly participating in combat, such as Infantry battalions, to combat service support units, located to the rear and whose combat functions may differ little from their peacetime activities. Measures of combat effectiveness must be referenced to the battlefield and an enemy which will shape the combat environment. Lastly, CE should reflect all of the constituent elements of combat capability. Therefore, CE is defined based upon four factors that can be measured relatively objectively--capability of weapons, personnel, logistics, and training readiness--and two factors that are primarily subjective--tactical readiness and personal leadership.

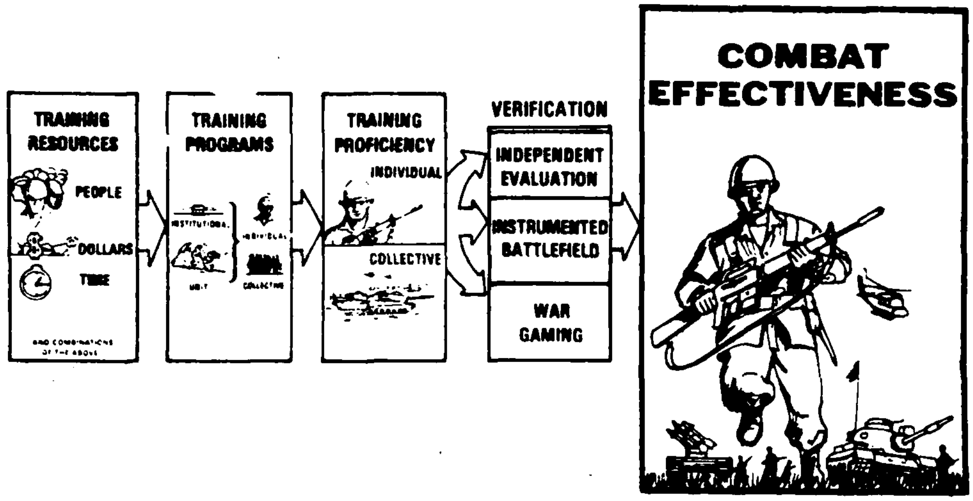


The ultimate standard must be that the Army is able to react on very short notice to fight on a complex battlefield which demands extraordinarily competent performance. Success requires a very high level of proficiency across-the board as units enter combat. Thus, it is vital that the articulation of combat effectiveness provide a rationale to support the provision of resources required to train to the necessary levels of proficiency.

HOW THE MODEL WORKS

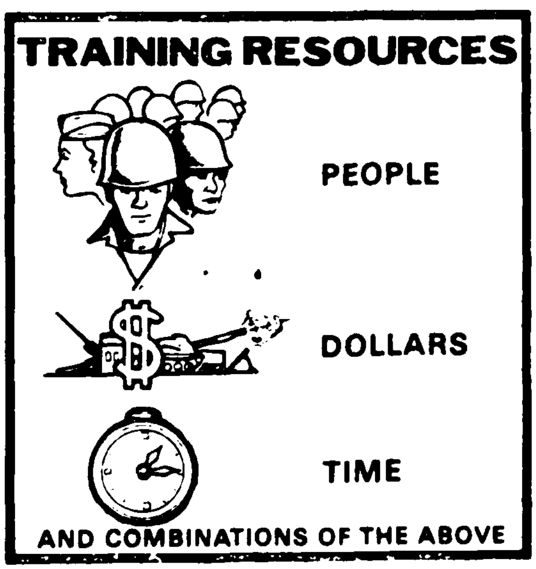
The ARTS Model is designed to provide this rationale--by relating the amount of resources (people, dollars and time) applied to various training programs (institutional and unit; individual and collective) to attain a level of proficiency (degree to which individuals, crews, or units are trained to perform an assigned mission).

MODEL...
ARMY TRAINING SYSTEM



Training proficiency maintained over time results in training readiness. In turn, training proficiency is related to combat effectiveness by a combination of verification techniques.

ELEMENTS OF THE ARTS MODEL



Resources, the three-part "engine" which drives combat readiness, are analyzed collectively as the first element of the ARTS Model.

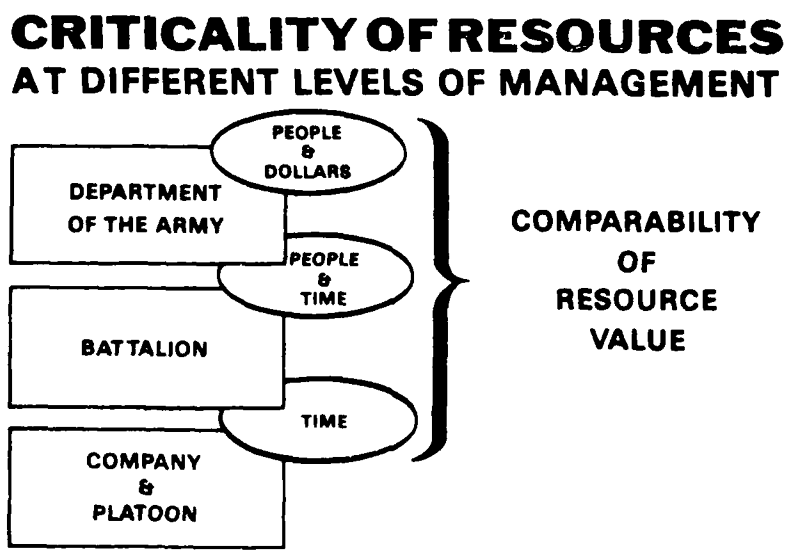
(1) People - The quantity and quality of personnel--officers, noncommissioned officers, and individual soldiers.

(2) Dollars - Inclusive of the cost of personnel; the availability and quantity of facilities to include classrooms, ranges, and maneuver areas; nonexpendable equipment to include individual and crew-served weapons, weapons systems, training devices, simulation devices, and expendable materiels such as ammunition, spare parts, and fuel.

(3) Time - That time available for the conduct of both institutional and unit training programs. Particularly important is time available at the small unit level.

Understanding the effective, efficient use of training resources requires the development of common costing procedures relating levels of resources to training readiness. It also requires evaluating the advantages of reapportioning resources and answering the questions, to the various elements of the training system, How much is enough? and, Where should it be allocated?

Since allocation of resources occurs at different levels of management, the Army must be sensitive to the comparability of resource value at these various levels.

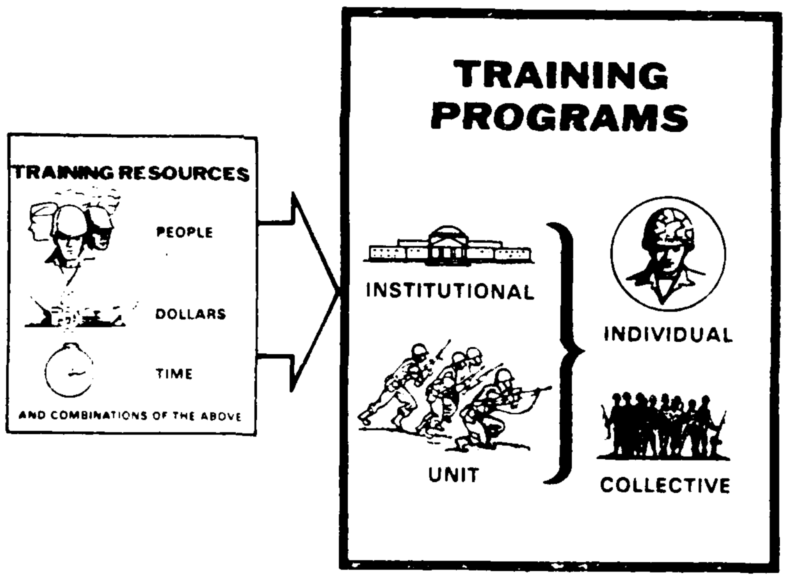


Cost-effectiveness analyses focus on dollar costs, but the other resources of people and time are equally important. If each is not adequate at unit level, the most dollar-effective program may not actually occur. At the Department of the Army level, the primary concern of planners is dollars and people. At division and battalion levels of responsibility, the most significant concern is people and time, with the emphasis placed on people. At the training execution level of leadership, company and platoon, the

most critical resource, and the one which most influences actual training proficiency, is time. There is a powerful interdependence among the three resource categories which is difficult to portray to decision-makers at the various management levels. For example, determinations made at the Department of the Army level should reflect the impact that decisions regarding dollar costs may have on the training resources available at the execution level. A "good" decision to purchase a weapon based on dollars may be a poor decision based on the time required to train to proficiency in the unit. If sufficient training time is not available in the unit, efficiency postulated to justify a dollar-based decision will not be present.

TRAINING PROGRAMS

Training programs constitute the second major element of the model. Sufficient training resources paired with viable training programs are needed to produce individual and unit training proficiency. Thus, Army training programs, which are a combination of institutional and unit training, must be closely associated with training resources.



To assist the reader, some terms are defined:[1]

(1) <u>Institutional training</u> is "training, either individual or collective, conducted in Army schools (Army service schools, USAR schools, NCO academies, unit schools) or Army training centers." Institutional training also includes that training conducted at DOD schools and those schools of the other Services.

(2) Unit training is "training, either individual or collective, conducted in a unit." This includes on-the-job training.

(3) Individual training is "training the individual officer, NCO, or enlisted soldier receives, either in institutions or units, that prepares the individual to perform specific duties and tasks related to the assigned MOS and duty positions."

(4) Collective training is "training, either in institutions or units, that prepares a group of individuals (crew, team, squad, platoon or higher) to accomplish tasks required of the group as an entity."

The objective of training is proficiency for the modern battlefield--today measured by the Army training and evaluation program (ARTEP) mission.

OBJECTIVE OF TRAINING

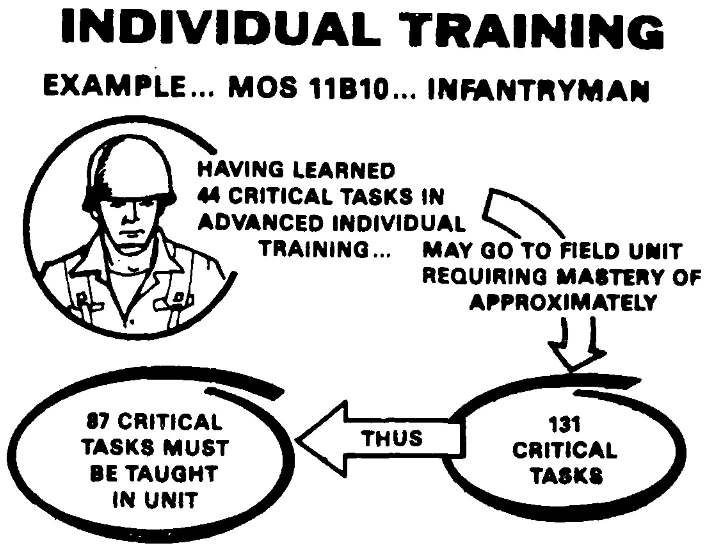
THE INTEGRATION OF A SERIES OF INDIVIDUAL AND COLLECTIVE TASKS RELATED TO COMBAT CONDITIONS AND STANDARDS ESTABLISHED IN ARTEP (ARMY TRAINING & EVALUATION PROGRAM)

The ARTEP describes the critical combat missions which a unit must be able to perform, as well as describing the conditions and standards the unit is expected to train to. Implicit within the ARTEP missions are the successful performance of individual and collective tasks.

INDIVIDUAL TRAINING

Many believe that the soldier receives all of his individual training in the institution, leaving the commander in the field responsible only for collective training and refresher training for individual skills. This is

not true, since much initial training on individual tasks must still be taught in units.[2]



For example, the Military Occupational Specialty (MOS) 11B10 (infantryman) demands mastery of approximately 131 critical tasks as listed in the soldier's manual (SM)--a document which describes the conditions and standards for all individual tasks the soldier is expected to perform. However, only 44 of these tasks are taught in the institution. The remaining 87 tasks must be taught in the unit.

COLLECTIVE TRAINING

There is more to total training proficiency, however, than achieving proficiency in individual tasks. Mastery of these provides the basis for collective task proficiency--the cornerstone of collective training.

Collective tasks are those tasks accomplished by a group (squad, platoon, company, or battalion) to meet a precise training goal. Inherent in the accomplishment of the collective task is the satisfactory performance of a number of individual tasks.

For example, the requirement to prepare battle positions means the group must accomplish the following individual tasks, among others:

(1) Prepare range cards.
(2) Employ mines.
(3) Fire claymore mines.
(4) Recover mines.
(5) Implace demolition charges.

ARTEP

The culmination of individual and collective task training is the ARTEP which integrates tasks in the context of a combat situation. For example, a company in the defense requires the integration of the following series of collective tasks (not all-inclusive):

(1) Tactical movements.
(2) Security - Intelligence Operations.
(3) Cover - Concealment.
(4) Coordinated employment of nonorganizational combat support assets.
(5) Employ organic small arms.
(6) Employ fighting vehicles.
(7) Employ organizational antitank weapons.
(8) Employ organic mortars.
(9) Fire and maneuver/movement.
(10) Prepare battle positions.
(11) Reconnaissance.

These collective tasks also need to be accomplished to conduct a successful defense at the squad, platoon, and battalion levels.

ACTUAL VERSUS SIMULATED TRAINING

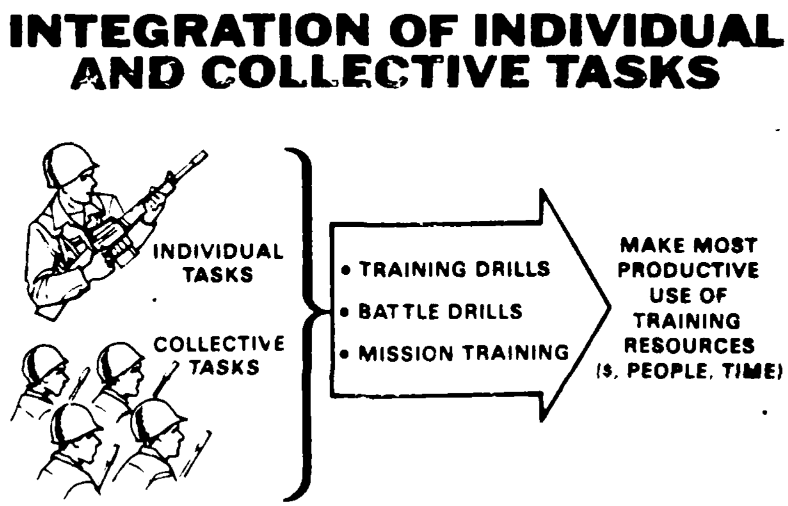
The training programs required to develop collective proficiency and maintain readiness may be categorized as conventional--those which are actually conducted on the ground--and those which are simulated.

Conventional collective training assigns time (days or hours) devoted formally to various training objectives using unit equipment as directed by the commander. Resource (time) conserving alternatives can be equally effective for some collective task training. This may be best exemplified by collective training involving simulation. This type of training is especially effective in sharpening staff and leadership skills. Examples include the Battalion Analyzer and Tactical Trainer for Local Engagements (BATTLE), and the Computer-Assisted Map Maneuver System (CAMMS), and tactical exercises without troops (TEWTS). It is not always necessary to have troops physically maneuvering on the ground in order to train staffs.

Individual training can also be designed to economize time resources. There is formally scheduled, traditional individual training which is listed on the training schedule and for which resources are allocated, and there is individual training for which time is not formally scheduled. The latter may occur after duty hours or when directed by the supervisor. By anticipating the availability of open time, informal training may be accomplished using aids such as "hip pocket" training materials or training extension courses (TEC).

INTEGRATION OF INDIVIDUAL AND COLLECTIVE TRAINING

Individual and collective tasks are closely interrelated. By properly selecting collective training events, individual skills can be reinforced.



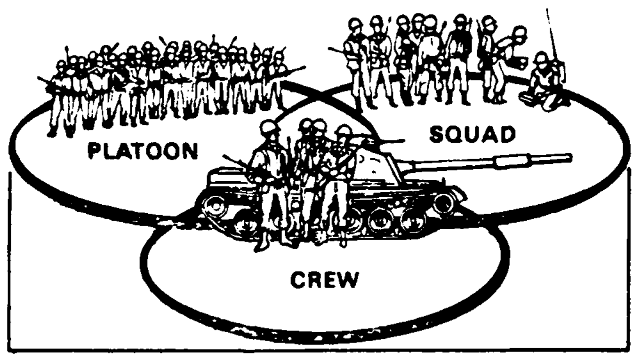
Training packets grouped as "training drills" and "battle drills" could be made available to the unit to permit personnel to make the most efficient use of their available training time. For example, training drills, which address basic skills with reduced time, distance, and condition factors, could be conducted in local garrison areas, whereas battle drills could be conducted in more distant maneuver areas under more realistic combat conditions. Within these training packets, there is a mutually reinforcing area in individual and collective training where full integration of learning of individual and collective tasks can occur. If training events are selected from this area of integration, both individual and collective skills are improved simultaneously. This is integrated training. Another aspect of integrated training that can be utilized is the use of unscheduled lapses in collective training to conduct training with the "hip pocket" training sessions previously discussed.

MULTIECHELON TRAINING

Time for training is always critical. Therefore, the commander needs to use a form of multiechelon training; that is, training several elements of an organization concurrently.

MULTIECHELON TRAINING

INVOLVES SEVERAL ELEMENTS OF AN ORGANIZATION CONCURRENTLY

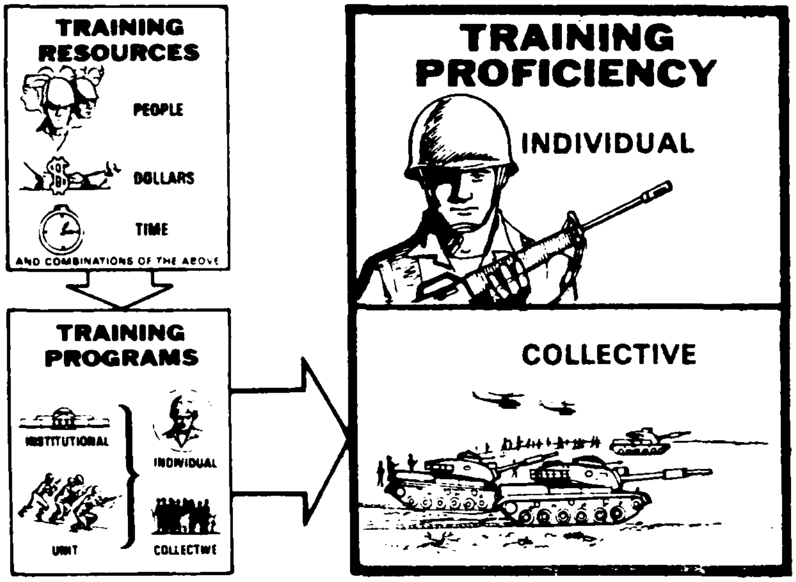


COMPANY LEVEL TRAINING

For example, a multiechelon, company-level exercise could have simultaneous training objectives for two or more organizational elements within the company (crew, squad, and platoon). Similarly, commanders and staff at battalion level and above can participate in concurrent, yet separate training which will hone their skills. The use of multiechelon, integrated training is essential to achieve the required levels of effectiveness in the time available.

TRAINING PROFICIENCY

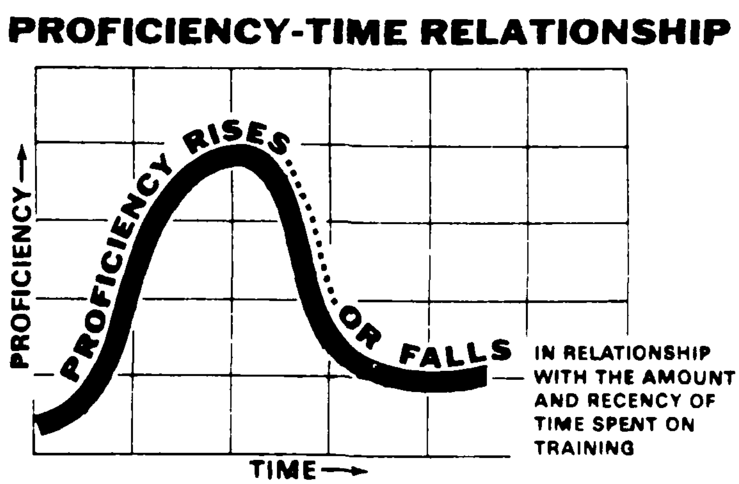
The third element of the ARTS Model is training proficiency. Adequate resources combined with various training programs will result in proficiency.



Training proficiency is the degree to which any individual or unit is trained to perform an assigned task or mission. *For purposes of the ARTS Model,* optimal training proficiency is assumed to be that which ensures successful operations against the threat.

PROFICIENCY-TIME RELATIONSHIP

Individual and collective training proficiency are dynamic because proficiency generally rises and falls in a positive relationship to the amount and recency of time spent on training.

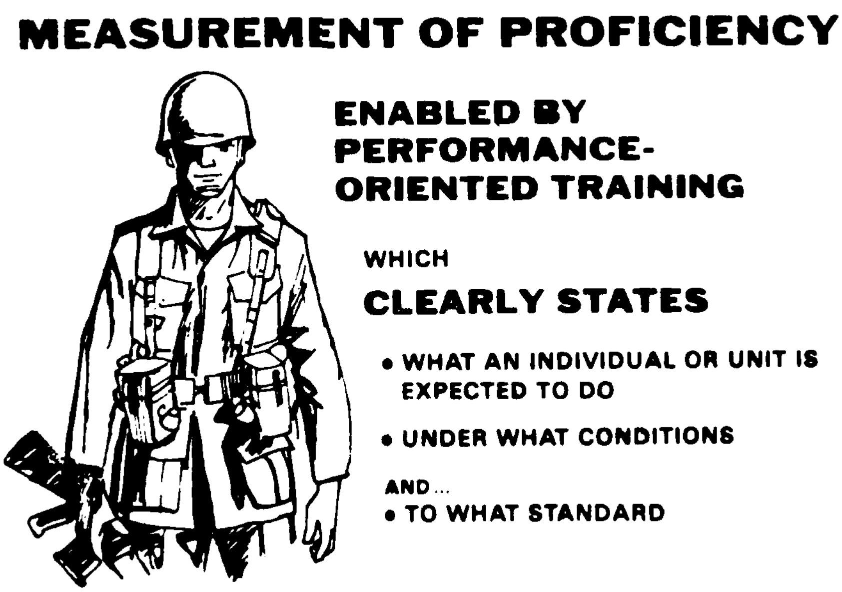


As a result of this training-proficiency relationship, the focus of the trainer must be on maintaining a minimum acceptable level of proficiency or readiness. Training readiness applies to both individuals and units, and considers the time available between perception of a threat and the planned commitment of an individual or unit. Proficiency must be sustained at a level such that, in the time available before commitment, it can be raised to the level required for success on the battlefield.

The key in determining the "steady-state" training program is the amount of training which the unit can actually conduct measured against that required to maintain training readiness. For example, responsibility for initial skill training can be allocated to the institutional training base or the unit based on a number of factors, but the basic determinant should be what the unit can accomplish while still maintaining required levels of readiness. Tasks beyond the capability of the unit must be absorbed by the institutional training base if readiness is not to be degraded.

MEASURING TRAINING PROFICIENCY

Performance-oriented training begins and ends with objective measurement. The Army has adopted a training philosophy of clearly stating what an individual or unit is expected to do, under what conditions, and to what standard.

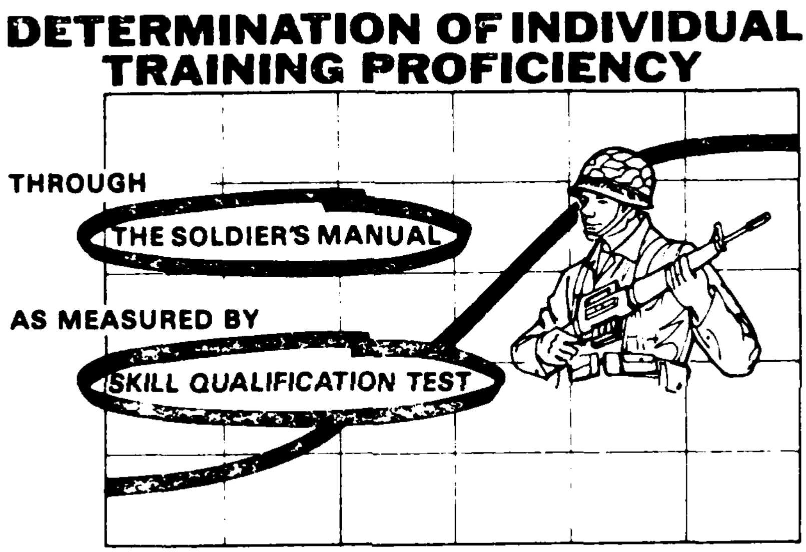


Once a performance standard has been set, it is vital that periodic assessments be made of how closely performance matches established standards to verify proficiency as well as to determine resource requirements and program adjustments. It is impossible to know what resources are

needed unless the actual capability of the Army is compared with the capability required to win on the battlefield. Thus, proficiency needs to be measured.

INDIVIDUAL TRAINING PROFICIENCY

Individual training proficiency is determined through use of the soldier's manual (SM) and measured by the skill qualification test (SQT).

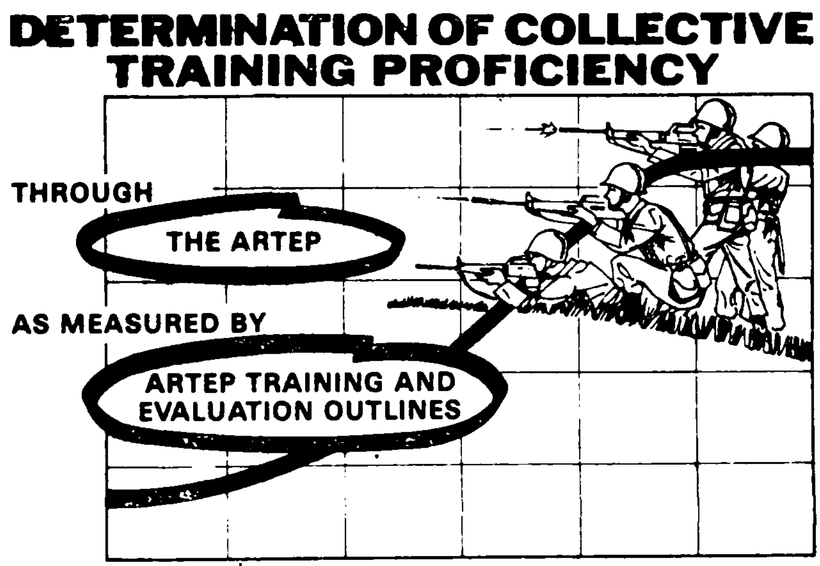


The SM and SQT represent the institutionalization of performance-oriented training for individual soldiers. They also provide a framework for the development of a comprehensive objective training and evaluation system for individual soldier skills. For the first time, the Army can measure a soldier's ability to perform his job against the proficiency needed to perform satisfactorily in a combat situation. The SQT can also be used as a diagnostic tool by providing specific information on individual training deficiencies. This can be an important step in improving individual job skills and collective performance.

COLLECTIVE TRAINING PROFICIENCY

Although individual skills are essential to group performance, successful team performance requires more than a simple aggregation of independently proficient individuals. Team effectiveness depends on integrating individual performances with a coordinated group striving toward a common goal.

For example, members of an Artillery gunnery team will have varying levels of proficiency but if as a team they can put projectiles on target, they are successful in reaching their goal. Just as the soldier's manual defines the training objectives for the individual, the ARTEP establishes performance-oriented training objectives for collective training conducted through training drills and battle drills. The ARTEP serves as a summary of combat-critical missions which are essential to a unit's success in combat--tasks, conditions, and standards required for successful unit performance.



The ARTEP is effective as an evaluation tool in addition to its diagnostic and management functions. It is primarily used for informal evaluation by the battalion, but it has been utilized as a formal evaluation tool when administered externally. Unlike the test of individual training proficiency provided by the SQT, no independent, standard, formal evaluation of collective training proficiency presently is available. However, the unit commander at any level can request that the unit be administered various tests to assess overall unit training proficiency in individual, collective, and mission tasks. These evaluations can take one of several forms:

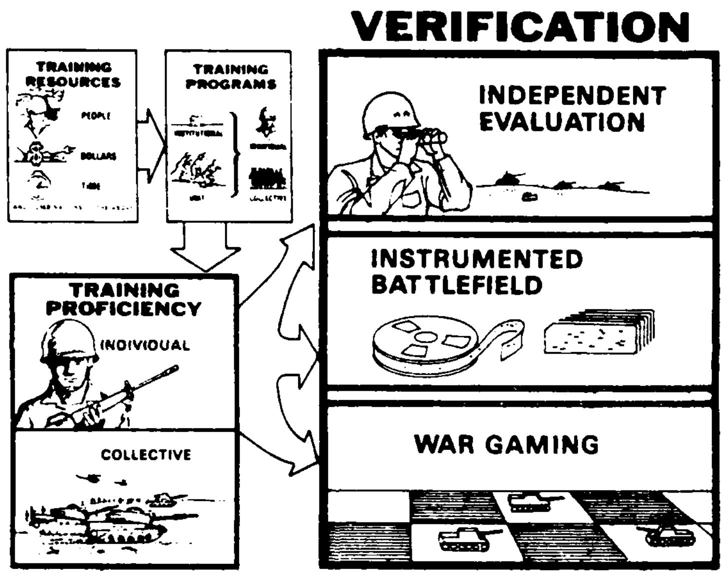
(1) Formal external ARTEP evaluation.
(2) Operational Readiness Training Test, including an Emergency Deployment Readiness Exercise.
(3) Tactical Evaluation (TAC EVAL, USAREUR).

Besides the SQT and ARTEP, there are other evaluation techniques available. The ARTS Model deals primarily with SOT, ARTEP, and readiness reporting programs because they constitute the primary measure of proficiency and readiness in use today. A more complex discussion of proficiency measuring techniques is included in the concept paper on Training Proficiency, Readiness and Combat Effectiveness at Annex B. Training readiness does not

necessarily translate directly to satisfactory combat effectiveness because it does not take into consideration all the factors that must be included in such a rating.

VERIFICATION

As noted earlier, to translate proficiency into combat effectiveness, some verification must take place. This becomes the fourth element of the ARTS Model.

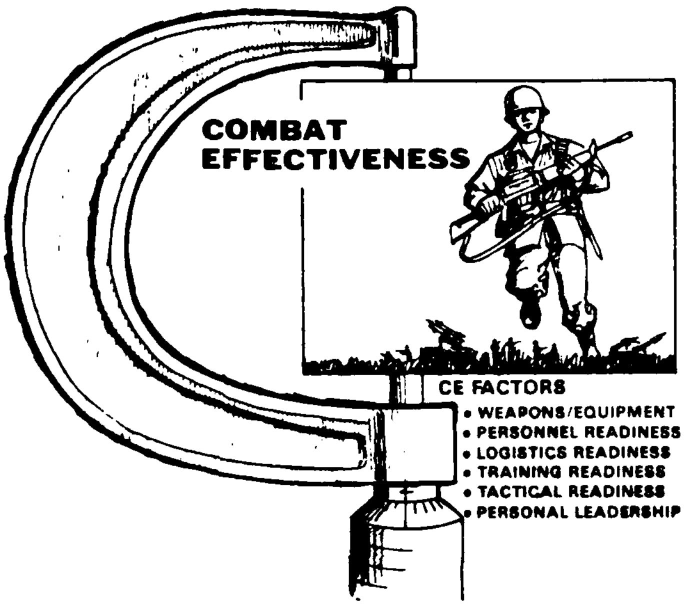


The ARTS Model visualizes three methods of verifying and translating training proficiency into an estimation of combat effectiveness.

(1) Independent evaluation. This is essentially a subjective evaluation by experienced commanders based on personal observations. It is the primary method of verification currently available.

(2) Instrumented battlefield for combat and combat support units. This is a field exercise fought with sophisticated hit/kill simulation devices that have the capability of play-back telemetry that measures battle outcomes. Once this instrumentation is available, it should be possible to measure the growth of unit proficiency as the unit faces difficult battlefield simulations.

(3) War Gaming. Although not yet available for large scale training purposes, this is a valuable diagnostic tool. This procedure consists of the waging of a mock battle by computer or battle simulation, and allows a product which may be descriptive of combat effectiveness, particularly as new parameters of measurement are developed by "trial and error" on an instrumented battlefield.



WHY VERIFY PROFICIENCY

The Army needs to verify its state of training proficiency in order to:

(1) Know its true capabilities as a basis for making force development, doctrine, and contingency planning decisions.

(2) Estimate its combat effectiveness for intelligent, justifiable resource allocation decisions.

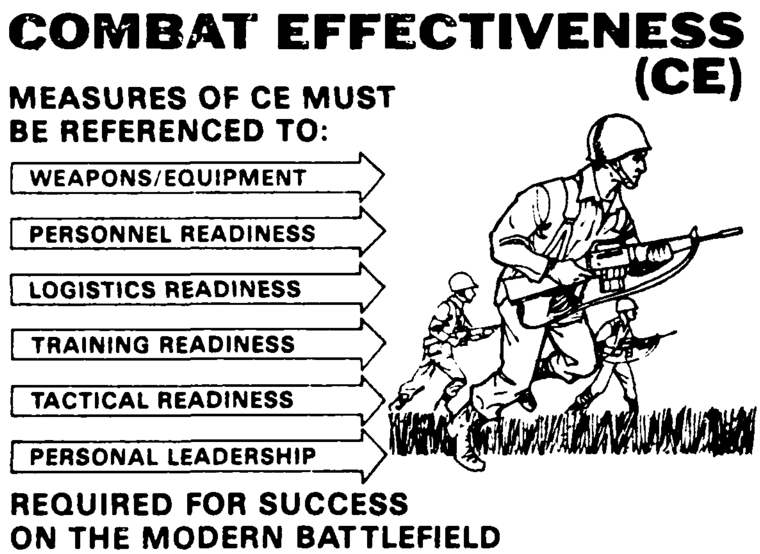
(3) Permit objective evaluation as a solid fulcrum on which to use the powerful leverage of competition to encourage competence and to stimulate innovation.

A good verification system should contain the following features:

- Meaningful
- Accurate
- Support integrity
- Provide useable information to the proper leader
- Current
- Fair
- Describe strengths and weaknesses

COMBAT EFFECTIVENESS

Training resources have now been traced through the various elements of the ARTS Model--training programs, training proficiency, and verification. The final product, and last element of the ARTS Model, is a subjective combat effectiveness (CE) rating best expressed in terms of the six factors that make up CE, both objective and subjective, as noted earlier:



(1) Weapons/Equipment Capability. Objective measurement of the design characteristics, both physical and performance, which are aggregated in sufficient detail to satisfy the needs of the particular user. Examples would include, but not be limited to, probability of hit/kill over range, survivability, reliability, availability, and maintainability.

(2) Personnel Readiness. Objective measurement of the numbers and qualifications of personnel as outlined in AR 220-1. This focuses on operating strength, MOS match or mismatch, and turbulence.

(3) Logistics Readiness. Objective measurement of the ability to sustain and support the force at its maximum potential level of effectiveness--equipment presence and serviceability as outlined in AR 220-1.

(4) Training Readiness. Objective measurement of the unit's ability to perform specific individual, collective, and mission tasks.

(5) Tactical Readiness. Subjective measurement of the ability of a commander and his staff to integrate the components of a complex battle system to meet the changing demands of the battlefield environment and accomplish the mission--the professional competence of the organization.

(6) Personal Leadership. Subjective assessment of the leadership climate of an organization and the leadership ability of its subordinates.

RESULT OF CE RATING

Once a level of CE has been determined, a unit possessing a sufficiently high level vis-a-vis the enemy threat would proceed to a sustainment type training program. A unit with a less than acceptable level of combat effectiveness would conduct both sustainment training and retraining programs. This would require more resources which would be related through the unit training programs to improved training proficiency as reflected in higher training readiness and a higher level of CE.

SUMMARY

This paper has outlined the conceptual approach to an Army Training System as described in six research concept papers. The paper discussed the design of the ARTS Model to include major model elements and how resource inputs for both individual and collective training programs are related to the final training product--combat effectiveness.

FOOTNOTES

[1]Army Regulation 350-1, Military Training.

[2]Department of the Army Pamphlet 350- (Draft), SQT - A Guide for Leaders, Headquarters, Department of the Army, 1 April 1977.

UNIT TRAINING PROGRAMS

by

Major Clarke M. Gillespie, Jr.

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CHAPTER I

BACKGROUND

Being prepared to win the battles of the next war is the principal goal of the peacetime Army. This mission of preparedness involves having the right people in the right jobs, the proper equipment in good working order, and the Army's units trained to the point that they can confidently expect to fight and win though outnumbered. Maintaining this state of training as the training base decreases and enemy capabilities increase is the major challenge facing the Army's trainers.

This paper examines unit training in the Army, starting with a brief synopsis of recent history in chapter I. Chapter II discusses the theory of training as it applies to unit training. In chapter III, unit training conditions are described--the restrictions, distractors, and steps some units are taking to overcome them. Finally, chapter IV lays out a concept for improving the efficiency and effectiveness of unit training programs by utilizing integrated, multiechelon training.

Going back at least as far as World War II, the United States Army has followed a training model that started with individual training (usually in some sort of training institution), progressed to small unit training, and then proceeded through several steps which culminated in a large-scale maneuver. Toward the end of World War II, the Army had devised a training system which specified five training phases: individual, unit, combined, field (or maneuver), and preparation for overseas movement.[1] For the Korean War, the system remained essentially the same: basic individual training, advanced individual training, unit training, combined branch training, followed by a field exercise and maneuver phase.[2] This eventually evolved into the system until recently in use which consisted of a cycle wherein the individual soldier went through basic combat training and advanced individual training in the training base, then joined a unit which operated on a unit cycle similar to the one in use in USAREUR in 1960 which consisted of the following:[3]

a. Advanced individual training to improve the proficiency of minimum-service personnel or to provide refresher training for men of longer service.

b. Basic unit training to improve proficiency of crews, teams, and squads.

c. Advanced unit training to integrate crews, teams, and squads into small units.

d. Combined arms training to integrate Infantry, Armor, Artillery, Engineer, and other supporting units into company and battalion/battle group exercises.

e. Combat mission training to include readiness tests (alerts), rehearsals of operational plans, and joint and NATO training.

The culmination of the unit's training program was an Army training test (ATT) which was administered annually by evaluators from outside the unit. The intent of the ATT was to determine the unit's capability to accomplish its mission, to measure the technical proficiency of its individual soldiers, and to identify training weaknesses. The ATTs were accompanied by Army training programs (ATPs), which served as guides for preparation of the ATT.

ATT Review Board

While there was an inherent logic in the "building block" approach, starting with the individual and progressing through successively larger collective units until the overall unit takes a test, problems developed in both concept and practice. In 1959, the Commanding General, V Corps, appointed a Board of General Officers to study Army Training Tests, chaired by (then) Brigadier General Creighton W. Abrams.[4] The board found that the ATTs were branch-oriented and did not reflect combined arms doctrine. The ATTs were highly structured with checklist procedures, but were not reflective of what a unit would be expected to do in a combat situation. "The current ATT program, with its stylized drill and over-developed check list, is believed to be an outgrowth of an academic environment and is the antithesis of the facts of life on the battlefield."[5] The grading system came under particular attack. The bulk of the evaluation score at battalion and battle group level (70-80%) came from subjective judgments by relatively low-level (company and platoon) evaluators. And "the root of this dissatisfaction (with the scoring systems) stems from the fact that the test score has become widely accepted as a fundamental basis of comparison between commanders and military units. As a result, commanders who are being tested go to unusual and unrealistic measures to achieve a high score, often irrespective of tactical conditions or the exercise of sound judgment."[6]

Despite cautions to the contrary by both CONARC[7] and USAREUR,[8] units tended to peak their training programs for the annual test; hence, the whole cycle was driven by the scheduling of the ATT. This in turn led to a decreased, and sometimes unacceptably low, level of training proficiency between ATTs, particularly as the Army entered a period of increased turbulence and reduced resources. The means to counter this decline in proficiency would appear to be a system of periodic evaluations

such that training readiness was maintained throughout the year, not just at ATT time.

In time, ATTs developed another failing which contributed to their elimination. During the Vietnam era, units outside the combat zone suffered a severe drawdown in personnel and equipment, yet they were not relieved of responsibility for an ATT, nor were test standards formally lowered. With pressure to maintain the semblance of combat readiness, the ATT evaluations became less and less indicative of the true condition of the unit. Thus, the ATT soon fell into disrepute.

HumRRO Initiatives

In a positive vein, there were parallel trends intended to put the measurement of training on a sounder scientific basis. In 1951, the Army undertook to improve the quality of its training and leadership through application of behavioral and social sciences. To this end, The George Washington University established the Human Resources Research Organization (HumRRO) at the Army's request.[9] An example of HumRRO's work is the TRAINFIRE program in which the Army taught rifle marksmanship in the traditional manner, firing at bullseye targets at known distances. While this method of training is easy to control and score, it does not necessarily teach the trainee the skills he requires in combat. HumRRO developed a program to teach the trainee to shoot in a situation more closely akin to a combat environment. In TRAINFIRE, "the trainee learns to _spot_ a man-shaped, silhouette target which pops up on the target range; he learns to _estimate_ its distance as he sights his rifle; and he learns to _fire_ until he hits the target or until it drops from sight."[10] The program was developed, troop tested between August 1955 and October 1956, and implemented Army-wide in 1957.[11]

While most of HumRRO's work dealt with individual training in the institution, some work has been done in the unit training field. In the early 1960's, two portable war gaming devices--a Miniature Armor Battlefield (MAB) and an Armor Combat Decision Game (CDG) were developed to train tank platoon leaders and crews. Field performance tests indicated that officers and crews trained on the MAB and CDG performed approximately 20-25% better than those not so trained.[12]

It is significant to note that in FY 1967, small unit training and performance amounted to 9% of HumRRO's work program (vis-a-vis 32% for individual training).[13] By FY 1974, this figure still amounted to only 11% of the effort by the US Army Research Institute for the Behavioral and Social Sciences (USARI), HumRRO's successor in this respect.[14]

Another of HumRRO's initiatives was the introduction of "systems engineering" of training courses, as promulgated by CONARC Regulation 350-100-1 in 1968. The underlying philosophy represented a significant change in the way in which Army courses were designed. The skills which were

determined necessary for mastery of a particular MOS were derived from examining training as a subsystem within the larger system in which the soldier functions. The programs involved proceeding through the following process:[15]

a. Job analysis

b. Selecting tasks for school training

c. Training analysis

d. Developing training materials

e. Developing testing materials

f. Conduct of training

g. Quality control

Although "systems engineering" represented a conceptual advance in training theory, the program was not fully executed. However, substantial groundwork was accomplished. Approximately one year after the start of the program, the HumRRO staff reviewed the progress to date. They found that "the content of training programs is being changed and improved through systems engineering. The programs are being reoriented toward actual job requirements, reducing the 'nice-to-know' and focusing on the 'need to know'.[16] Still, the focus remained on institutional training.

Board for Dynamic Training

The Board for Dynamic Training, functioning from August through December 1971, was a landmark in the Army's unit training. The board was chartered by the Chief of Staff of the Army (CSA) to accomplish the following:[17]

a. Estimate the state of training in units of the combat arms, worldwide, Vietnam exclusive.

b. Forge new links among combat arms service schools and tactical units.

c. Recommend how to make training in units more exciting and meaningful.

The board's findings were quite extensive. To highlight a few:

a. Training in the Army was only marginally adequate.

b. Major obstacles to training of active forces were personnel turbulence, manning levels, inadequate budget, and lack of qualification

among NCOs (E5-E6).

c. Major obstacles to training in Reserve Components were the rigid training system, discipline, inadequate budget, and lack of NCO qualification.

d. NCOs resented the fact that the Army offered them no substantive help in preparing for the annual MOS test.

e. There was a tendency to overlook the requirement for individual training in units.

f. Both active and reserve personnel wanted help from the combat arms schools.

g. Training devices in the field lagged considerably behind the technology available.

h. A major effort was needed to improve combat arms training, including, among other things, simplified and believable battle drill.

The board produced a considerable number of recommendations intended to redress the weaknesses it discovered in the training system. A significant aspect of the board was that it undertook to address the totality of the Army's training spectrum, both institutional and unit, Active and Reserve Components.

Current TRADOC Programs

A major recommendation of the board was creation of the Combat Arms Training Board (CATB) to serve as a catalyst to implement the board's recommendations. With the Army reorganization in 1973, CONARC became the Training and Doctrine Command (TRADOC). The TRADOC represented a broader view of its responsibilities to the force as a whole than did CONARC. Whereas the systems engineering approach had been geared to improvement of the institutional training course, the TRADOC systems approach focuses on the soldier's job performance. The following chart compares these two different approaches to training.[18]

Systems Engineering	Systems Approach
Process oriented	Product oriented
Course based	Job based
Instructor derived	Field observation/ survey
No overall MOS plan	Soldier's Manual
No feedback	Skill Qualification Test

Figure 1-1. Training Approaches

The key feature of the present approach advanced by TRADOC is interaction between the school and the field--to the field in the form of exportable training, and from the field in terms of feedback and results. Imbedded in this process is utilization of the advances that have been made in training technology. Key features of the current thrust of Army training are:[19]

a. Performance-based and job-critical;

b. Individualized, and useable at schools and duty sections; and

c. Evaluated and driven by critical-skill, performance-based, criterion-referenced testing.

Courses are in the process of being converted from a fixed-time length in which all students are presented material at the same rate, to a self-paced mode wherein each student is advanced when he demonstrates mastery of a particular skill through a performance test. Students are gauged against an established performance standard rather than the normative standard of their contemporaries.

In the area of collective training, the Army training program, with its annual cycle, has been replaced by the Army training and evaluation program (ARTEP). The ARTEP does not specify a cycle to be followed; rather, it specifies the tasks the unit is to be able to perform, the conditions under which they are to be performed, and the standard to be met. The commander is expected to develop his training program to bring his unit to the standards of the ARTEP measured essentially in a diagnostic mode.

In addition, great strides have been made recently to enable the combat arms commander to conduct realistic training. Traditionally, fire and maneuver were taught either through live-fire exercises, which perforce were one-sided and constrained by safety requirements, or through non-firing two-sided exercises. The latter type training becomes unrealistic in that targets in fact are not "killed" and a controller must make a judgment as to whether to assess a casualty. In 1972, ARI undertook research for improving collective training.[20] The first product, REALTRAIN I, or squad combat operations exercises - simulation (SCOPES), was demonstrated at Fort Benning in July 1973 and introduced worldwide commencing in January 1974. In SCOPES, telescopes are mounted on the individual rifles and a two-digit number affixed to the helmet of participating individuals. Two squads are maneuvered against each other, and casualties are assessed when a soldier correctly identifies the number of an opposing soldier. Controllers verify the "kill" by radio. In REALTRAIN, the SCOPES procedure is expanded to incorporate larger forces and additional weapons systems such as light antitank weapons (LAWS), recoilless rifles, antitank weapons (TOWs and DRAGONs), and tank main guns. Scheduled for testing in 1978 is the Multiple Integrated Laser Engagement System (MILES), which uses

eye-safe lasers to simulate weapons effects. MILES should eliminate the requirement for large numbers of controllers, provide real-time feedback, and allow simulation of near misses. SCOPES, REALTRAIN, and MILES comprise a type of training called tactical engagement simulation. This training has the enormous advantage over previous collective training techniques in that it builds experience in skills transferable to combat, possesses a built-in motivational aspect through the competitive scoring system, and is well received by the troops.

Summary

Traditionally, the Army has followed a training model which started with individual training in institutions and unit training, and worked up through small units to annual large-scale maneuvers which included a test.

This system was criticized in that the testing was largely subjective and the training was not geared to the specific needs of the unit. Further, units tended to peak for the annual test, and test standards and readiness requirements were not responsive to the varying levels of resources made available for training.

In the early 1950's, the Army began to incorporate behavioral science and training technology into unit training. This emphasis has resulted in more realistic training at a savings in training time.

In 1971, the CSA chartered the Board for Dynamic Training. The board's findings and recommendations formed the basis for many of the Army's present training programs.

TRADOC is currently oriented on support of training in the unit as well as in the institution. The thrust is toward identification of job-based critical skills, both individual and collective, performance-oriented evaluation, and exportable training.

Tactical engagement simulation represents a marked step forward in the conduct of collective training.

CHAPTER II

THE THEORY OF UNIT TRAINING

For years, training in Army units proceeded on the assumption that the trainee had been trained completely on individual skills in the training base, so that the unit need concern itself only with tactical unit training--the sequential basic combat training/advanced individual training/basic unit training/AIT in units/field training exercise model. This erroneous assumption arose partially from lack of clear definitions; hence, unit training and collective training became synonymous in many minds.

Unit training, as presently defined,[21] consists of individual and collective training conducted in the unit. Training conducted in the training base is virtually entirely concerned with individual skills; therefore, the primary focus of unit training is on collective training (that is, training of teams, crews and larger aggregations of soldiers). The unit still must train individuals on those job-related skills which are not trained in the training base, and conduct refresher training to maintain proficiency on those skills that are.

Unit Individual Training[22]

The relevance of the job environment to the design of individual training programs was recognized by George Washington University's Human Resources Research Organization (HumRRO) many years ago. Over the years, this led to the development of a systematic procedure for design of individual training programs portrayed at Figure 2-1.[23] Although HumRRO's focus was on institutional training, the systematic approach provides insights to the structure of an individual training program in the unit.

The initial step involves analyzing the job environment--"the functions of all the people and equipment that operate together to produce the intended end result or product of the system."[24] In the next step, a job model is developed which identifies the inputs and outputs associated with the particular job. Inputs describe the information stimuli which are provided to the individual, and outputs are the performance required of the individual.

At this point, the model takes two branches. A careful analysis must be made of the desired performance outputs. "Minimum standards of performance are set in terms of systems requirements."[25] These standards

provide the performance objectives which are incorporated as the design objectives for the following steps. Next, a determination is made of the skills required of the individual in order for him to be able to respond to the inputs from his job environment so as to produce the proper outputs. This is followed by an analysis of those required skills to determine which are properly the subject of the training program, since not all skills will have to be trained. This analysis leads to the determination of "enabling objectives"--those intermediate objectives whose attainment indicates the individual has acquired the requisite abilities. These enabling objectives are then the basis for designing specific training programs.

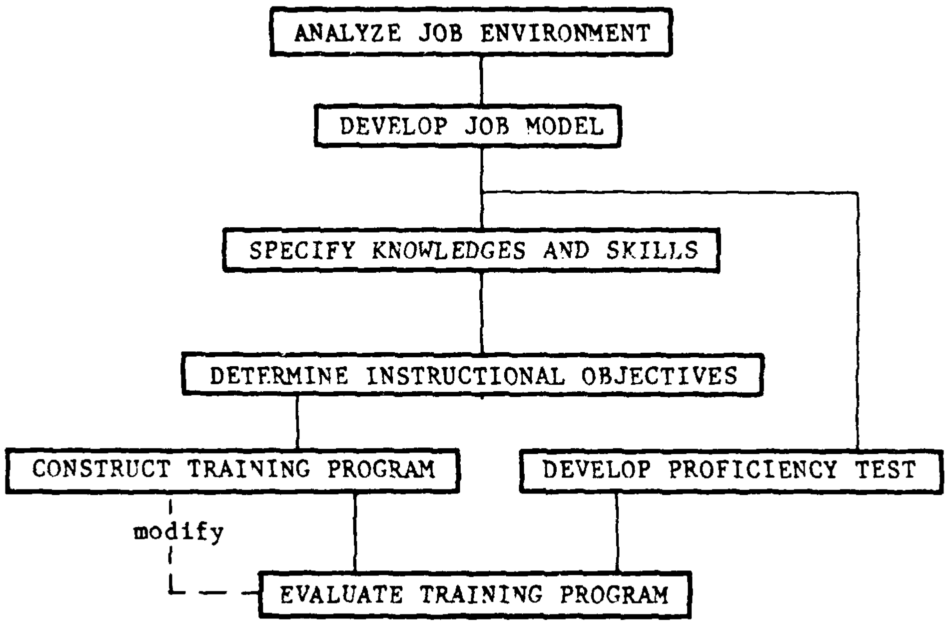


Figure 2-1. Systems Approach Model for Training Design[26]

The final phase is the evaluation process. The trainee's performance is measured against a test which itself is based on job requirements. Based on the results of the performance test, the training program can be modified.

There are several key features of the model which have particular application to the unit training environment.

a. The basis for individual skill requirements is governed by how the individual is expected to function in his job environment. This would argue for training that is oriented toward the specific individual in his specific job situation. This implies management of the individual training

program at a level low enough to be able to identify these specific requirements.

b. The individual should be tested against realistic, job relevant standards. "The testing situation presents realistic inputs to the student who performs in an actual or simulated job environment to produce a required output. Minimum standards of performance are set in terms of system requirements."[27] In application to the unit training environment, this means provision of a system which has both performance-oriented testing and established standards.

c. The training program should be capable of modification based on test results. In a discussion of design of learning environments, Goldstein makes the point that the training situation should be structured to ensure that not only is the student informed of results, but that provision is made for modification of the program.[28]

One other aspect of individual training which has a major impact in design of unit training programs is retention. Researchers have established some broad parameters describing acquisition and retention for certain types of tasks:[29]

a. Simple motor tasks: rapid acquisition, slow loss

b. Complex procedural tasks: gradual acquisition, fast loss

c. Fine, precise skills: slow acquisition, immediate loss

Clearly there will be a requirement that the unit training program provide for repetition of individual skills to retain proficiency. Few data to date are very useful in establishing the required frequency of repetition for sustainment of individual military skills. Based on the complexity of equipment entering the inventory, it is reasonable to assume that the requirement for frequent repetition of individual skills will increase.

Unit Collective Training

In the presentation quoted above, Dr. Milton Katz stated that there were few data on team and tactical skills. This is somewhat of an understatement since there is not in the analytical community even a generally agreed definition of what constitutes a team.[30] The Defense Science Board found that while the Services have pioneered many technological advances in training of individuals, "insufficient attention is now being given to collective training, i.e., to the training of crews, groups, teams, and units."[31] As the following discussion will reflect, collective training in the Army has received added emphasis and there are some promising results. The importance to the military is obvious.

> "Interdependent, coordinated team performance is a predominant characteristic of most operational activities within the military services. Training of teams in operational units is the transition between initial individual training and combat. The influence of effective team behavior upon system performance clearly has implications for training. Team training is more difficult, and is assumed to be more costly, than is individual training. It is usually performed in operational environments or in high-fidelity simulations of such environments. For these reasons, sound data are needed for use in determining the relative effectiveness of alternate training concepts as a means for improving team training."[32]

There is no clear definition of what constitutes a team, regarding size, structure, composition and other possible delineators. The word "team" is used to describe a track team, which consists of a number of individuals who perform specialized tasks independently; a wrestling team, whose members perform the same task, but function independently of each other; and a football team, which requires simultaneous coordinated performance of specialized skills. Possibly there are other variations and combinations.

To provide structure for this discussion, the following definitions were selected:[33]

A team consists of two or more individuals who are associated in work or activity. The team is rigid in structure and communication pattern, and is goal-oriented with well-defined functions for each member. The performance of the team depends on the coordinated participation of all members. The focus of team training is on team skills. This definition serves to distinguish the "team" context from the "multi-individual" context. The latter term describes two or more individuals who may be grouped together, but whose functions are essentially individual skills.

Teams may be structured either in a serial or parallel pattern. In a serially structured team, the output from one member serves as part of the input to another. In a parallel structure, the function of one is not dependent on the function of another. For the serially structured team, the performance of the team is limited by the performance of its least skilled member. It is, however, impossible to generalize that one type structure is universally preferable to the other; the function the team is to perform would dictate to a large extent the structure.

There are Army analogs for both serially and parallel structured teams, as well as multi-individual groupings, all of which are included under the term "collective" training. The forward observer--fire direction center--howitzer section would be an example of a serially

organized team. The functioning of a radio-teletype team or mechanics in a motor pool are examples of parallel structure. Examining the interactions of members of a tank crew yields examples of both.

Relationship of Individual and Team Skills

Regardless of the type team under consideration, the bulk of research to date indicates that individuals must be proficient at their individual job skills in order for the team to function effectively. This finding has led some researchers to conclude that team performance is simply the sum of individual performance and, hence, individual training should receive priority over team training. However, it was found that in emergent situations (that is, ones in which all possible conditions and responses cannot be established beforehand) which require coordination between members, team training was essential for successful performance. Wagner concluded that:

> "...although certain laboratory studies showed that team training was superfluous when the tasks required only individual skills, other investigation, primarily in more realistic emergent situations, showed the importance of team training. When "team skills" (e.g. interaction), even though poorly defined, were important in the task situation, team training was more effective than individual training."[34]

Given that development of team skills is essential, particularly in tactical training, then design of a team training system can be developed through a process analogous to the approach taken for the individual training program. The team's mission should be determined in terms of the attainment of group goals. Specific team tasks and standards may then be developed. Members of the team should understand the team's objectives and how their functions contribute toward them. A realistic training environment should be structured to simulate as nearly as possible the combat environment in which the team would be expected to function. And finally, training should culminate in a diagnostic test to provide feedback both to trainees and trainers. "Performance feedback is unquestionably the single most critical parameter in team or individual training."[35]

The key elements to a team training program may be summarized as realism which creates a series of emergent situations that cause the team to exercise its team coordinative skills and an objective diagnostic feedback system. This establishes a team training program comparable to the "functional context" approach which has proven effective in individual training.

To further complicate the collective training problem in the military, there is the additional complication of tactical training, where leaders deploy and maneuver forces against a hostile force. "For individual and

crew or team procedural training, physical fidelity is of primary importance; the rifleman must be able to assemble, disassemble, and fire his weapon; the tank crew must be able to work as a team in the operation of the tank and its weapons. For tactical training, psychological fidelity plays a large role. The training situation must represent a credible combat simulation wherein actions that may be demanded in combat are practiced."[36]

Just as performance-oriented, individual training is intended to develop experience on the part of an individual, experiential learning techniques are being developed for collective training. In order to develop the proper responses (that is, responses that are transferable to a combat environment), the experiential training environment must have the following characteristics:

a. The individual must be an active participant in the situation, rather than a passive observer.

b. The cues to which the individual responds should resemble as closely as possible those he would encounter in combat.

c. The situation must change realistically as a result of the individual's action.

d. Feedback that occurs as a consequence of the individual's action should be immediate and realistic.

e. Subsequent objective post-exercise feedback must be provided to the individual on the appropriateness of his actions in order to reinforce good tactical behavior and eliminate mistakes.

f. The complexity of the simulated tactical situation must increase as more elementary tactical skills are mastered in order to expand the individual's experiential base.

g. As the learning of tactical skills is situation-specific, sufficient training opportunities must be provided across varying conditions (missions, terrain, visibility, etc.) to ensure the learning of all relevant skills.[37]

Role of Leader

The dominant role of the leader on the performance of a team is an area which has had little theoretical development. The leader not only develops the team's ability to perform its collective functions, he also develops the team esprit, that intangible factor which causes teams to perform at levels higher than their individual abilities would indicate. In discussing the application of analytical techniques to combat situations, one author concluded "a confusing element in the equation was and

is that outstanding leadership...transcends or overrides the standard rules."[38]

Of particular interest is research done by Carl J. Lange in 1967.[39] Lange defined the characteristics of a group as: a group code or set of values, capability to perform, motivation to perform, and group results. Lange felt that "the significance of the leader's behavior for group performance lies not only in specific actions relative to specific performance, but also in the relevance of his actions to the development and modification of the four types of group characteristics just discussed.[40] Lange defined the leadership function, relative to group behavior, as: defining the group task, motivating performance, providing for needs, and handling information. He concluded that "the effectiveness of the leader...requires judgements on his part relating to the performance of group members, conditions under which they are performing, and the state of group members in respect to needs, abilities, knowledge and so forth. Training approaches will need to emphasize the development of skill in making such judgements as well as skill in executing appropriate behaviors."[41]

In research involving air defense crews,[42] Palmer found that the influence of the leader depended on the performance measure selected and the echelon of leader considered. "The performance of radar crews seemed to be most closely related with the characteristics of the crew leaders, while attitude and morale measures were more closely associated with the actions of the battery commander."[43] This would suggest crew performance of technical procedural tasks to be more closely related to the characteristics of the immediate supervisor. In a study by HumRRO of the effect of the tank commander on crew effectiveness, researchers determined that the tank commander had greater influence over the tactical performance of his crew than in the performance of maintenance.[44]

Wagner further concluded that evaluation of team training effectiveness should address the following areas:[45]

a. The definition of team performance objectives in terms of specified, observable outcomes, to include criteria for acceptance and conditions of performance.

b. The definition of a metric or range of values applicable to each specified observable event.

c. The detection, measurement, and recording of the value of an observed event at each occurrence.

d. An evaluation of the team as having attained or not attained the objective based on discrepancies between outcome criteria and observed event values.

e. The feedback of team performance data to the training environment.

A promising development in tactical team training for the combat arms is the advent of tactical engagement simulation. High resolution simulation devices have been used effectively for years in individual training; however, such devices are generally very costly. Engagement simulation is built around two-sided, free play exercises, with approximately real-time casualty assessment and feedback furnished by means of an after-action review (AAR) immediately following the exercise. If desired, the exercise can be repeated following the AAR to provide reinforcement. Engagement simulation also has motivational aspects, in that it creates a competitive team-building environment.

Summary

Individual training conducted in the unit should make maximum use of relevance to the job environment. Training should be tailored to the individual's job performance and measured against known standards. Both trainee and trainer should receive diagnostic feedback.

Individual training will have to be repeated periodically to account for individual forgetting. The more complex the task the individual is expected to perform, the more often it will have to be repeated to maintain individual proficiency.

Little hard data exists on team performance.

The term "team" is used to describe a variety of groupings of individuals. When teams form a structured group which coordinates to accomplish a goal, it may be organized in either serial or parallel structures. "Multi-individual" groups have only individual functions. All three classes are found within the Army term "collective" (as in collective training).

Team members must have requisite individual skills if the team is to function effectively.

Team training is required to develop the coordinating skills required.

Performance feedback is essential to both teams and individuals.

Job relevance (realism) is significant to team training as well as individual training.

Engagement simulation is a promising approach to team training.

CHAPTER III

UNIT TRAINING ENVIRONMENT

> "The European battlefield involving the forces of the Warsaw Pact poses the greatest challenge to our land forces. The Warsaw Pact fields some of the most formidable forces in the world, both in size and quality. The Warsaw Pact forces deployed in East Germany, Czechoslovakia, and Poland can attack NATO's Central Region without reinforcement, and they can do so in a relatively short time after the decision is made. This short warning time and the corresponding difficulty in responding rapidly to such an attack further heightens the challenge of the potential European battlefield. While our national interests and our foreign policy require a European focus and reliance on coalition warfare, we must exercise caution that we do not overemphasize these aspects in our planning. We have important commitments in other parts of the world. Recognizing this fact, the Army is attempting to retain sufficient flexibility to respond to less demanding but perhaps more likely contingencies elsewhere. Presently we can respond with quick reaction forces that range from a platoon of rangers through an airborne brigade or division to a corps-sized force of three divisions and supporting forces totaling 100,000 troops. The Army's 24 divisions--16 Active and 8 National Guard--represent the smallest number we can maintain and still be able to respond to the various contingencies that we might face."[46]

Readiness Requirements

The statement above, taken from the Army Posture Statement for FY 1978, serves to frame the situation in which the US Army finds itself today. For the first time in history, US forces are operating in a peacetime environment, yet subject to virtually immediate involvement in a furious first battle of the next war, which could in fact turn out to be the last battle as well. Unit commanders find themselves faced with a requirement to maintain a specified level of readiness (that is, the ability to deploy and fight effectively), while dealing with the traditional peacetime

training distractors. To further complicate the commander's training situation, the Army is more equipment-intensive than at any time in history.

Readiness requirements vary from unit to unit, but all units in the force structure have a requirement to maintain a specified level of readiness in order to be able to enter combat within prescribed time constraints. Some units, like the 3rd Armored Division and the 82d Airborne Division, are subject to virtual immediate commitment and, consequently, must be continuously fully combat ready. Some reserve units are not planned for commitment until 30 or more days after the outbreak of hostilities. This requirement has more than training implications. Maintenance of equipment deserves a fair share of the unit's available time, else the unit may not arrive at the battle on time with equipment in condition to fight. But maintenance of equipment may be getting more than its fair share of unit time at present in many units vis-a-vis training. Basically, this is true for two reasons: the maintenance community has clearer and more specific standards, and commanders, cognizant of the fact that maintenance performance is readily measurable, frequently make it the subject of command emphasis.

The maintenance system offers an excellent contrast with the training system. For maintenance, the Army has a highly structured, completely measureable (though not totally objective) system which specifies both inputs and outputs. In terms of inputs, materials such as maintenance allocation charts, lubrication orders, and technical manuals, specify exactly who is to do what and how often it is to be done. TM 38-750 and various supplemental regulations specify how the performance of these services are to be recorded. AR 220-1 and various other regulations (in particular regulations governing Annual General Inspections) specify how maintenance is to be measured and how the result is to be viewed in terms of readiness. Generally, publications are written in terms of "what is the piece of equipment supposed to do" and "how well does it do it." Another aspect of the maintenance system which is worthy of note is that in relating equipment status to readiness:

a. Not all equipment is considered equal.

b. There are clearly defined standards that are specified for readiness reporting.

c. The readiness reporting system allows for variance based on reduced authorizations.

One measure of equipment readiness deals with the status of equipment on hand and another with the status of equipment compared to full authorization. Reportable items are identified by using a reportable items control code. The new AR 220-1 on Army readiness reporting procedures, expected to go into effect 15 August 1978, further refines the equipment list by identifying a separate category of "pacing items" which are

particularly critical for the unit's mission, e.g., helicopters for an aviation unit.

The Army further emphasizes the importance of the maintenance system by the degree of support it receives. Prior to assuming command, battalion command designees attend a Senior Officers' Preventive Maintenance Course. Within the battalion there are personnel assigned as clerks to handle maintenance and supply paperwork. The US Army Materiel Development and Readiness Command (DARCOM) further supports the system with technical representatives in the field to provide readily available expert advice. There is no full counterpart to these elements in the training system.

The requirement to maintain a specified level of readiness impacts on the unit commander's training situation in other ways beyond the demands of maintenance readiness. He must maintain his readiness within the context of personnel departing, being promoted, levied, etc. This raises two issues: the qualifications of the people he receives through the pipeline, and turbulence. It is clear that the level of readiness a unit can maintain is related to the individual and collective proficiency of its troops. It is also clear that the level of proficiency the unit is capable of sustaining is related to the level which the soldiers possess when they arrive in the unit. To illustrate, if all training--to include BT and AIT--were eliminated from the training base, and soldiers were sent directly to their units, unit training time would have to be expended on teaching the basic soldierly skills such as saluting, manual-of-arms, and so forth. Likewise, time would have to be spent on issuing uniforms and equipment. Under the circumstances described above, it would be impossible for the commander to maintain the same level of readiness that he could achieve with soldiers who have completed BT and AIT before arriving in the unit.[47] This fact is recognized in the DOD statement that "it is Department of Defense policy that learning objectives which can be accomplished more economically in the operational unit, without <u>unacceptable degradation of unit readiness</u> (emphasis added), should be provided as OJT rather than unit training."[48]

Personnel Turbulence

Turbulence is a serious enemy of training readiness in the Army today. Going back to 1971, the final report of the Board for Dynamic Training cited personnel turbulence as the number one obstacle to achieving dynamic training in combat arms units.[49] Turbulence may be defined as movement in and out of an organizational element during a specified time. Turbulence results from actions taken both outside and within the unit. Turbulence resulting from decisions made above the unit level on matters such as assignment policy and tour length is more properly called "turnover"; such actions are beyond the scope of authority of the company commander. Actions taken within the unit which cause turbulence include moving individuals to another duty position within the unit.

A certain amount of turbulence is inherent in that personnel are transferred or promoted out of their assignment, and this frequently creates a "domino" effect with several people changing jobs as a result. Other sources of turbulence are disciplinary transfers and unprogrammed requirements. Personnel are pulled out of units to form inspection teams, run post support functions, and fill unauthorized positions within units. One study found that over 50% of the personnel turbulence within a tank battalion occurred as a result of actions taken within the battalion. Figure 3-1 below illustrates the breakout of the relationship of turbulence to organizational element:

Change of	%/month
Position	22%
Crew	17%
Platoon	11%
Company	8%
Battalion	7%

Figure 3-1. Tank Battalion Crew Turbulence[50]

When one focuses on turbulence in leadership positions, the turnover of training managers presents an even more unsettled situation. Figure 3-2 below reflects data collected at 1st Brigade, 2d Armored Division, for the period 1 July 1975 to 20 January 1976.

Position	Authorized	Actual	% Turnover
Combat Platoon Sergeant (Line & Cbt Support Co)	37	81	119
Combat Platoon Leader (Line & Cbt Support Co)	37	73	98
Company Commander	16	34	113
Battalion S-3 Sections (E8 and above)	9	25	177
Brigade S-3 Sections (E8 and above)	6	19	217

Figure 3-2. Turbulence of Key Personnel[51]

It would be instructive at this point to examine the results of a study recently completed by the Army Research Institute on personnel turbulence and time utilization.[52] Based on a sampling of companies, the study found that for a typical company, by the end of the 4-month period:

a. 36% of the men were in the same job in the same squad.

b. 16% of the men were in the same squad, but had changed jobs.

c. 3% had moved to a different squad, but in the same job.

d. 21% had changed jobs and squads.

e. 24% had left the company.

Thus, from the squad leader's point of view, he had experienced a 48% (sum of c, d, and e) turnover in a 4-month period, or 12% per month. Other data collected as part of the same experiment supported a figure in the 12-15% per month range.

The picture might actually be much worse, particularly if the level of resolution is made smaller. In an experiment involving tank battalions at Ft Hood, only 4 of the 54 tank crews in one of the battalions remained intact after 3 months, an implied turbulence rate of 93% per quarter or 23% monthly.[53] Other figures indicate a turnover rate of approximately 60% per quarter for both CONUS and USAREUR; 50% if just the tank gunner and tank commander are considered.

While it is intuitive that turbulence results in lower training readiness, there is little information to date to quantify the relationship of turbulence to proficiency. The ARI Turbulence Test, conducted at Ft Carson in February-March 1978, tested the effect of turbulence on tank crews in performance on a gunnery table. Tentative results tend to support the "leader dominance" aspect discussed earlier; experienced tank commanders seemed to be able to overcome the effect of new men in their crew. Although not statistically rigorous, many ARTS "pilot" tests are expected to capture data on turnover which can be related to proficiency results to yield insights to the magnitude of the problem.

While it is clearly important to reduce turbulence, it is equally clear that it can never be eliminated. It is also true that the turbulence the Army incurs in peacetime is mild compared to what can be anticipated in combat, particularly in the initial stages of hostilities. Thus, any viable unit training program should accept some degree of turbulence as a fact of life and incorporate it as one of the design variables.

As TC 21-5-7 points out:

> "A fact of life for training managers is the continued turnover in personnel. Turnover is necessary, even desirable at times. Personnel turnover in a stable peacetime force, if the Army were to enforce uniform 36-month tours of duty, would amount to 2.8 percent of

each command per month, or 8.3 percent per quarter. But at battalion level no such stability exists. If the "normal" rotation permits only 24-month tours of duty in a unit, then the monthly turnover rises to 4.2 percent and 12.5% quarterly. And such external moves cause internal shifts and adjustments. The training manager must constantly provide for repetitive individual training of men moving up to new jobs.

> What is more, the training manager faces the imbalanced and in many ways, unpredictable rotation of key trainers--NCOs and officers. These key personnel will flow in and out at an even higher rate due to schooling and staff assignments. This turbulence will obviously cause a shortage of NCOs and qualified trainers."[54]

The primary resources the company commander has to concern himself with are facilities and time.[55] Although managed above company level, dollars (as reflected in money to purchase POL and spare parts) certainly impact on how the company conducts its training, particularly for equipment intensive units such as Armor, Mechanized Infantry, Air Defense Artillery or Signal. Lack of available dollars for POL and spare parts forces the unit to conduct training in garrison or nearby training areas. Another way to ameliorate the effect of a cutback in POL or spare parts is to shift emphasis to make use of training devices and simulators. For instance, radio teletype operators can maintain their International Morse Code capability through use of any of several code-key devices which do not require use of the actual radio equipment, thus saving on the use of radios, vehicles, and generators. A similar situation exists for ammunition, which like POL and spare parts, is managed above company level.

Facility Restrictions

Facilities pose another resource problem which the commander must take into account. Facilities include such things as ranges, maneuver areas, physical training test areas, classrooms, dayrooms, motor pools, parade fields, and learning centers. The availability of facilities has to be a basic consideration in planning training. Figure 3-3 illustrates the grouping of training facilities as found in TC 21-5-7. Generally, as their utility increases, the availability of these facilities decreases.

TRAINING FACILITIES	CONSIST OF	CHARACTERISTICS
INSTITUTIONS	Division & Command Schools	Key Personnel (PNCOC/BNOC); Low density, high skill courses (NBC, TAMMS, PLL).
GARRISON	Indoor (classrooms, dayrooms) Outdoor (motor pools, parade fields) Learning Centers	Relatively readily available; Can be used in conjunction with exportable training materials; Suitable for leader and small group training.
LOCAL TRAINING AREA	Limited Maneuver Subcalibre Range Mini-Ranges	Equipment-oriented tactical training; TEWTS; Can be used with SCOPES, REALTRAIN, etc.
MAJOR TRAINING AREA	"Unlimited" Maneuver Area	Will support complete combined arms, combat support, and combat service support (and Air Force) training.

Figure 3-3. Training Facilities Available to Active Component Commander[56]

Somewhat tangential to the commander's unit training mission, but a very valuable asset, are the command and division schools, the so-called "shadow schools". The Primary NCO Course (PNCOC) portion of the NCO Education System (NCOES) has been located in the divisions. This cuts down the time the individual is lost to the unit and hopefully thereby encourages commanders to let their best people attend, not simply those they feel they can spare most readily. Shadow schools typically teach

subjects such as NBC, generator maintenance, and TAMMS/PLL. Characteristic of the courses taught is that they generally address low density, high-skill jobs. Such schools enable the division commander to tailor the instruction to the particular needs of his units. For the company commander, while it does mean losing an individual from the unit for a time, it relieves him of the burden of setting up his own training in highly specialized fields for relatively few individuals.

Units in Europe have for years pegged their training projections to trips to the major training areas since these facilities provide the only opportunity for large-scale maneuvers. Increasingly, CONUS-based units are feeling the same squeeze. More room is required to conduct realistic maneuvers today than ever before, and the battlefield is growing larger. This situation has developed for a number of reasons. As shown in Figure 3-4, weapons have longer ranges. Figure 3-5 shows that the increased ranges from individual weapons and communications equipment, and increased mobility of combat vehicles, have lowered the density of personnel on the battlefield (this, of course, along with the nuclear and electronic warfare (EW) threat, which make dispersion a necessity). This squeeze for space, with other considerations, is part of the motivation for consideration of a National Training Center.

For the Reserve Component commander, the problem is considerably worse.[57] Facilities such as ranges and maneuver areas may simply not exist within a reasonable distance. Geographical considerations play an important role as well. As is pointed out in TC 21-5-7, a unit, for example a battalion, from a densely populated urban area may find its subordinate companies relatively nearby and relatively easy to assemble, but training facilities, particularly local training areas, may be nonexistent. Other units from more sparsely settled parts of the country may have abundant maneuver space, but find their subordinate units spread over hundreds of miles. Many Reserve Component units are able to make use of major training area facilities only during their 2-week annual training period.

Demands on Unit Time

By far the most important resource available to the unit commander is time, as the following points out:

> "The most valuable resource available to the commander is his men's time, and time once lost can never be regained. Poorly prepared, unimaginative, or unnecessary instructions waste a soldier's time. Worse, it is boring and soon results in ineffective, poorly trained individuals with no initiative or esprit. The skillful commander is the one who adopts the philosophy of gainful employment for each man, and one who takes maximum advantage of every training hour to insure value received."[58]

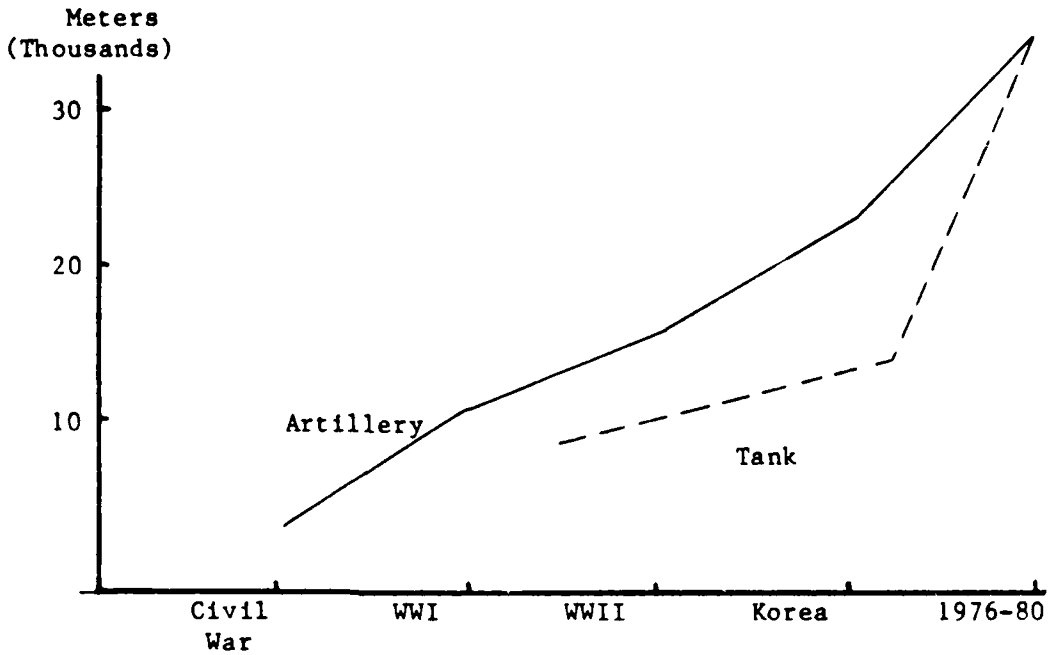


Figure 3-4. Maximum Ranges of Principle Weapons[59]

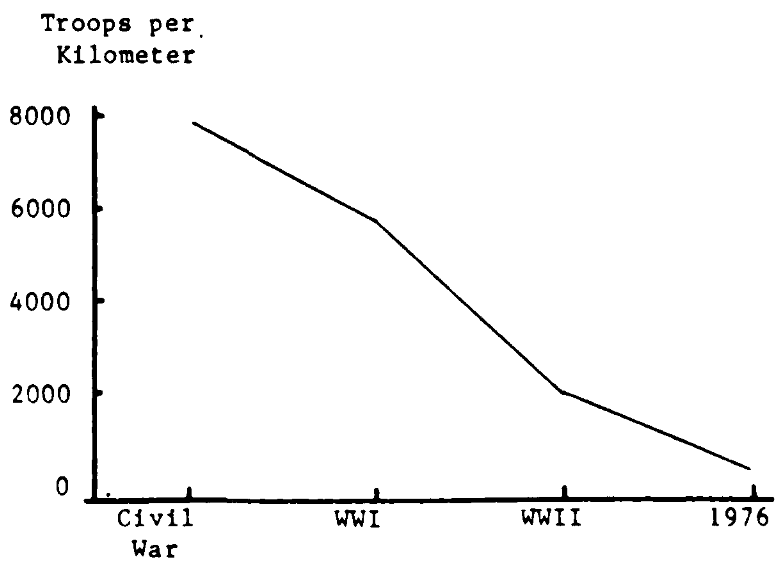


Figure 3-5. Troop Density Along Division Front[60]

"Training time is one of the Army's highest-priced commodities. Whenever a training activity is directed in such a way that the soldier's available hours are used unprofitably, a scarce and expensive commodity is being unacceptably wasted."[61]

Demands on the unit's time for purposes other than training must be as old as the Army itself. A typical list might be:

a. Community projects.

b. Ceremonies, VIP visits.

c. Competitions (organization day, etc.).

d. Facilities and barracks upkeep.

e. Support of schools, clubs, recreational facilities and the like.

f. Personal needs, such as dental appointments.

Although the type projects listed above (and the list could surely be made longer) detract from training time, this does not imply they are not properly the unit's business. Each has its value and in some way contributes to the betterment of the unit.

Likewise, another list could be made of training subjects which are required for various reasons but which are not directly relatable to the unit's immediate tactical mission. For example,

a. Drivers Training.

b. Safety.

c. Personal Effectiveness.

d. Human/Race Relations, Equal Opportunity.

e. Military Justice.

f. Hague and Geneva Convention.

g. Drug and Alcohol Abuse.

Again, these subjects have their value to the individual and to the unit, but they consume time that is thereby not available for the conduct of individual and collective mission-related training.

Prime Time Training

There are basically two techniques being used to reduce the distracting effect of these other demands. The first is to group these non-mission-related activities together for performance within some specified block of time. Or, stated another way, it amounts to setting aside certain periods of time for only mission-related training. The second technique, to make best use of nonmission-related activities, is to structure them such that unit integrity is maintained so that at least some team work can be developed while performing details such as guard or area police. To overcome the effect of training distractors, the basic concept in the planning of time is the idea of prime training time as stated in Army Regulation 350-1:

> "Commanders will establish and support prime time for conducting mission related training. Prime time for training should be established at the lowest possible level while maintaining unit integrity. Prime time training will be supported by all commanders, especially those with authority to control the scheduling of diversionary activities (special duty, administrative appointments, general educational classes, honor guards, fatigue details and routine medical care).[62]

Recognizing the difficulties in conducting training, many units break their training time out into three cyclic periods: prime time, a time period devoted to support activities, and a third category somewhere in between the other two. TC 21-5-7 cites an example of a CONUS Infantry division which divides its time into 6-week cycles as follows:

a. Prime time (X time): Maximum collective training is conducted, with individual training integrated. Units are exempt from details or outside commitments. The time will be spent primarily in the field, either in major training areas (MTA) or local training areas (LTA).

b. Local training time (Y time): Units train primarily in the LTA, although prime time units have priority if there is a conflict. Units will also provide back-up to post support units. Training emphasis during this period is on individual training and equipment-oriented, collective training.

c. Post support (Z time): As the title implies, units will provide guards, details, and support of prime time units. Training emphasis is on individuals, particularly use of of division schools, general educational development (GED) courses, and the like. It is explained that the selection of the 6-week cycle was made by the post commander based on readiness requirements, availability of training areas, and other considerations.

The 3d Armored Division in Germany plans its cyclic training on a weekly period although the major subordinate commander may extend the period.[63] The "X-Y-Z" plan works as follows:

a. X-Status week: Units will conduct intensive training. Individual training may be conducted on Monday, Tuesday and Friday. Tuesday morning (0600) through Friday morning (0600) is set aside for particular emphasis on critical, collective tasks, with 100% of the unit's available-for-training strength participating. Units will not be assigned other commitments nor be subject to outside inspection.

b. Y-Status week: This time is specified for garrison, classroom, and individual training. Mandatory subjects and General Inspections will be scheduled during Y-Status. Units are subject to maintenance and supply inspections.

c. Z-Status week: Units in Z-Status will perform details. To the extent possible, unit integrity will be maintained so that companies, platoons and squads not committed on detail will be able to conduct training.

Thus, the present thrust is to accept the fact that nonmission training activities will always be with us and to organize training activities with this in mind.

There is another dimension of time that impacts on the unit's ability to conduct effective training; that is the availability of time for leaders to plan and prepare training. There are basically two approaches employed to make most effective use of available preparation time; one is to structure the preparation time, and the second is to anticipate training time opportunities that may arise, particularly during the post support and the back-up post support cycles.

T-3 System

Both elements are contained in the 7th Infantry Division T-3 system.[64] Basically, the system works by selecting the training goals and allocating training areas at T-3 or 3 weeks in advance of when the training is to be conducted (T-week). The company commander assigns instructors, identifies subjects for integrated training, and publishes the training schedule. The next week, T-2 or 2 weeks prior to the conduct of the training, is devoted to selection of training techniques, arrangements for necessary support, rehearsal, and briefing of the troops on the training objectives of T-week. The week prior to the instruction (T-1) allows for more preparation. In addition to the scheduled training, "hip-pocket" lesson plans (lesson plans on 5 x 8 cards) are prepared by the units on specified subjects, and the classes are taught as opportunities present themselves during T-week.

Another key element to making better use of each planner's time is to

spread the instructional load and designate certain topics to be taught outside the structure of the training schedule. This is embedded in the current thrust of charging the NCO supervisor with the responsibility for the individual training of the soldiers he supervises. Each individual will have a soldier's manual which lists the critical skills for his MOS and skill level. He will also be checked biannually by a skill qualification test (SQT). The NCO is expected to conduct periodic "mini-SQTs" and record the soldier's performance in a job book. The preface of each soldier's manual contains this message:

> "If you don't understand any parts of the manual or want to know more about advancement opportunities, see your squad leader. Take advantage of his knowledge and experience. At the top of your enlisted chain of command is your sergeant major. He is an expert in helping younger soldiers learn about training, evaluation, and the system for getting ahead in the Army. As such, he is responsible for insuring that your NCOs either provide the assistance you need or refer you to him for his guidance and help. The Army wants and needs well-trained soldiers who desire to advance through the ranks. This manual and the willing assistance of your senior NCOs are the tools you can use to your advantage and the Army's."[65]

One purpose of the SM/SQT and job book system is to take the burden off the training manager to determine in detail who must teach what and when, insofar as individual skills are concerned.

Time Utilization

It might be of interest at this point to take a look at one study[62] of how training time was actually utilized.[66] For this test, one observer was assigned to each of ten squads. The observers recorded what each member of the squad was doing for each 15-minute time unit, and entered results for six major activity areas: unit training (more properly, collective training), individual training (MOS skills), individual training (PT), teaching activities, support/garrison activities, and personal care. Examples are shown in Figure 3-6. For the companies observed, weeks were designated as either "training" or "nontraining." As discussed earlier, the intent is to block time to minimize the effects of nontraining activities. Some of the results of the study are shown in Figure 3-7. In addition, Figure 3-8 gives a breakout of the activities which caused squad members to be absent from the squad.

Note that absences from the squad remain about the same for both training and nontraining days, averaging 16% of the time. Of those periods of absence, roughly a quarter (26%) result from details or other duties, again remaining about the same for training and nontraining days.

Activity Category	Examples
<u>Unit Training</u> Focused on training individuals to perform as members of a team or unit.	ARTEP; Field Exercise: squad ambush; Indoor class on assembly area procedures; Field Exercise: company defense.
<u>Individual Training (MOS SKILLS)</u> Focuses on the skills (tasks which the individual needs to do his job).	Weapons qualification; Indoor class on camouflage techniques; Outdoor class on mine detector training; EIB training; Mortar crew drill; Class on first aid.
<u>Individual Training (PT)</u> Physical readiness training.	PT; Unit team athletics.
<u>Teaching Activities</u> Teaching or assisting in teaching for unit or individual training.	Teaching a class on land navigation; Demonstrating how to set up a minefield.
<u>Support/Garrison</u> Activities which support training; garrison duties.	Weapons issue and turn-in; Maintenance of weapons, equipment, vehicles; Maintenance of billets/buildings; Work details; Parades; Garrison guard mount; CQ.
<u>Personal Care</u> Authorized activities only.	Breaks; taking showers; changing clothes.

Figure 3-6. Major Activity Observation Categories

ACTIVITY AREAS	TRAINING DAYS % OF TNG DAY TOTAL	NON-TNG DAYS % OF NON-TNG DAY TOTAL	ALL DAYS % OF ALL DAY TOTAL
Unit Tng	14	4	9
Indiv Tng	15	4	10
Indiv Tng (PT)	8	10	10
Support/Garrison	31	56	43
Personal Care	14	10	12
Teaching Activity	1	1	1
Absences	18	15	16

NOTES:

Average number of men per squad: Training = 8.03
Non-Training = 8.46
All Days = 8.25

Figure 3-7. Distribution of Total Time Units by Major Activity Areas

	% OF TOTAL TIME ABSENT		
ACTIVITY	TNG DAY	NON-TNG DAY	COMBINED DAY
Medical	10%	3%	7%
Personal	4%	1%	3%
Military Education	21%	28%	25%
Personal Education	8%	4%	7%
Details/CQ	27%	25%	26%
Disciplinary	0%	11%	6%
Leave	8%	11%	10%
Clearing	10%	1%	6%
Comp Time	7%	5%	7%
Other	3%	11%	3%
TOTAL TIME ABSENT	1 hr 18 min	1 hr 2 min	1 hr 13 min

Figure 3-8. Breakdown of Activities Engaged in While Absent from Duty

This would imply that while formally there is an observable shift of activity from support/garrison activities to training as the unit goes from nontraining to training status, there is an underlying and significant core of detail-type activity going on all the time. Noteworthy also is the fact that soldiers in the observed unit were more than three times (10% vs 3%) as likely to have medical problems on training days, and four times as likely (4% vs 1%) to have personal requirements that take them from training. These differences might result from either the soldier's attitude toward the day's activities or perhaps the relative difficulty of getting released for medical or personal reasons.

Summary

The company commander is expected to maintain a specified level of readiness. For his maintenance readiness, he has publications which tell him what to do, how often to do it, how to record the performance of maintenance, how to gauge the readiness of his equipment, and how to relate the status of his equipment to the readiness reporting system. This contrasts sharply with the training system, which requires the unit to ascertain its own needs, frequency of repetition, and perception of standards.

Turbulence is a fact of life in the Army. As a result, the unit training program must be flexible enough to adapt to changing individuals at varying levels of proficiency.

The major resources of concern to the company commander are facilities and time. He must tailor his training program to make use of the facilities which are available to him. There are considerable demands on the unit's time other than training. To lessen the effects of competing demands, units generally block out time into three components: a period with primary emphasis on collective training (prime time), one devoted to post support, and an in-between period. Even so, there is some evidence this approach is not entirely effective.

The training program must be flexible enough to adapt to changing personnel and the availability of facilities. It must be designed to get the maximum training benefits from brief periods of time since personnel turn over rapidly, and the opportunities for bringing entire squads and platoons together are few.

To hold its own against the requirements of the maintenance system, training needs to be measured against objective standards and related to the resources necessary for its accomplishment.

CHAPTER IV

A CONCEPT FOR DESIGN OF UNIT TRAINING PROGRAMS

The previous chapters have briefly explored the environment, with all its distractors, in which units train today. It has been shown that the actual time available for training is quite limited, that facilities dictate to a large extent how training is conducted, and that turbulence makes it extremely difficult for a unit to maintain collective proficiency for any length of time. It has also been shown that the forgetting process will require periodic repetition of individual skills for retention, that performance-oriented training is an appropriate technique for obtaining specific results, and that realism and learning by experience are powerful training multipliers. With this background, a concept for the stucturing of a unit training program will be discussed. It is necessary at this point to define some terms and to introduce some terminology which will simplify the discussion later on.

Army Regulation 350-1, Army Training, defines unit training, as "training, either individual or collective, conducted in a unit". This distinguishes unit training from institutional training, which is "training, either individual or collective, conducted in schools (Army Service School, USAR School, NCO Academy, Unit School) or Army Training Centers".

Individual training is defined as "training the individual officer, NCO, or enlisted person receives, either in institutions or units, that prepares the individual to perform specified duties and tasks related to the assigned MOS and duty position". Officer training, or more specifically, training of officers in specific individual skills, is beyond the scope of this study.[67] The enlisted soldier receives training in individual skills initially both in BT and AIT. The focus of the individual training in BT is on subjects such as rifle marksmanship, first aid, and other basic skills of the soldier. In AIT he receives training that is specific for his MOS.

It is a common misconception that the soldier will receive all of his required individual training in the training base, and that the commander in the field is responsible only for collective traning and refresher training on individual skills. This not true, and never has been. There may be many different jobs which call for the same MOS.[68] It would be impractical, if not impossible, to train all skills needed for all jobs.

Earlier, TRADOC determined where a task was to be trained on the basis of how important the task was rather than where it should be taught. The implication was that if a task were important, it should be taught in the institutional training base.

A revised set of factors, more focused on the issue of where to train, was developed.[69] In analyzing where to properly train a tas, the folowing factors are to be considered:

a. Number of jobs in the MOS.

b. Variance in jobs.

c. Frequency of change in job assignment.

d. Predictability of job assignment.

e. Retainability of job knowledge and skill.

Notice that the primary orientation of this list of factors is the job; consideration of the required performance is the environment in which the task is to be performed. The first factor relates to the discussion above, essentially that for a single MOS there are a multitude of jobs and a corresponding multitude of tasks. The second factor points toward a major difficulty, particularly in jobs that are heavily equipment oriented. Mechanics and repairmen in particular are subject to a wide variety of equipment in the field. The field, multichannel, equipment operator MOS 31M is trained on 10 different types of equipment even though in a single tour he will probably work with only one or two. The third and fourth factors concern turbulence, a subject discussed in an earlier chapter.

The fifth factor, retainability of skills, is one of particular importance as more and more complex equipment enters the Army. It was noted earlier that complex procedural skills and precise skills exhibit virtually immediate loss. Not only may a soldier have forgotten them by the time he arrives in the unit, he may will have forgotten them before he completes AIT. For these skills, there is no alternative to teaching them in the unit.

The starting point for individual training is the soldier's manual. Soldier's manuals are to be published for nearly every MOS and skill level. Contained in each soldier's manual are the critical tasks which the soldier is expected to be able to perform, the conditions under which he is to perform it, and the standard he is to meet in order to perform the task satisfactorily. Also included is a list of references the soldier may refer to for additional information. From the soldier's manual certain tasks are selected for the skill qualification test (SQT) which is a performance-oriented test intended to determine if the individual is qualified

in his or her job (and/or qualified for promotion).

A parenthetical note at this point concerns the SQT. The soldier's manual/SQT process originated to support the Enlisted Personnel Management System (EPMS) rather than as a training system per se. The goals of the personnel manager and the trainer are to some extent divergent (maybe even diametrically opposed). If the tasks selected for testing truly represent the critical skills required in combat, then a trainer would be pleased to find all soldiers successfully performing all tasks. The personnel manager, on the other hand, is looking for discriminators which will allow separation between people for career management purposes.

It is reasonable to ask what the unit commander's interest is in individual training since the unit is evaluated in terms of collective performance. First, as mentioned above, the SQT is tied to the individual's career progression, and the leader has an obligation to take care of those personnel under his supervision. Second, turbulence requires that there be a degree of cross-training on individual skills, so that the crew can continue to function in the face of losses. Finally, collective performance is to a large degree dependent on individual performance. Although the synergism is difficult to measure, individual and collective performance are clearly related.

Collective training is defined as "training, either in institutions or units, that prepares a group of individuals (crews, teams, squads, platoons) to accomplish tasks required of the group as an entity. Although some collective training is conducted in schools (e.g. tank crew training), virtually all collective training is conducted in field units. Field Manual 21-6 further defines two types of collective training: equipment-oriented and tactical. These are defined as follow:[70]

Equipment-oriented collective training is designed to prepare teams and units to employ crew-served equipment (e.g. a tank, artillery piece, tactical bridge, mortar, TOW weapons systems, etc). Equipment-oriented, collective training objectives (i.e. tasks, conditions, and training standards) are developed in terms of how the equipment should be operated by the crew. This means the conditions and training standards are based primarily on the efficient operation of the equipment rather than on the terrain or enemy situation. For example, a mortar crew sets up and fires a mortar using essentially the same procedures regardless of the enemy situation or terrain. Similarly, the procedures used by an Engineer company to construct a bridge do not change substantially from site to site.

Tactical collective training is very much dependent on the enemy situation, the terrain, and other external factors (weather, visibility, etc). This means training objectives cannot be stated in isolation from tactical situations. While statements of tactical tasks are relatively straightforward and constant (attack a fortified position, conduct a reconnaissance patrol, etc.), the conditions under which these tasks must be performed

and the precise standards of acceptable performances should be developed in the context of a specified enemy situation for a particular piece of terrain. Therefore, in tactical training, the trainer should be given, or he should develop, an appropriate enemy situation for the terrain on which the exercise is to be conducted.

There are several key aspects of these definitions. Equipment-oriented collective tasks tend to be mechanical, procedural type tasks which to a large extent are dictated by the equipment. What is expected of each team member can be defined ahead of time and to an extent perhaps even rehearsed individually. One might be able to reduce the tasks to a drill. The performance expected of an individual as part of a tactical collective task, on the other hand, is not only dependent on terrain and weather, but also on the actions at any given moment of the other members of his team. In addition to the basic actions and techniques, tactical collective training involves developing a response to a variety of simultaneous stimuli. This corresponds to the "emergent" situation discussed in chapter 2.

The starting point for collective training is the Army training and evaluation program (ARTEP). The ARTEP is intended to describe the minimum set of mission capabilities that the unit should be capable of performing. Its role for collective training is comparable to that of the soldier's manual for individual training. Like the SM, the ARTEP specifies the tasks, standards, and objectives for the unit.

Interestingly, there is at present no formalized equivalent to the SQT for collective training. At the discretion of the local commander, units may be subject to various types of tests, such as an operational readiness training test (ORTT), tactical evaluation (TAC EVAL) or a "formal" external ARTEP evaluation.

Algebra of Unit Training Time

At this point, it is appropriate to introduce some terminology that will facilitate discussion of design of unit training programs. Definitions will be expressed in terms of the training time available in a unit (which, as was pointed out earlier, is considerably less than the total time available to the unit).

The total training time available to the unit is defined as T_T. The total T_T consists of the time allotted for collective training--primarily (but not exclusively) ARTEP related--defined as T_A, and time allocated for individual, soldier's manual-derived training, defined as T_S. As a first order formulation:

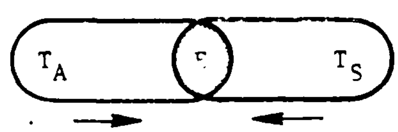
$$T_T = T_A + T_S.$$

One can further subdivide the two primary categories. Taking individual training first, the two subdivisions are defined as follows:

T_{S1} will be used to describe formally scheduled individual training. This training requires a formal time allocation on the unit training schedule, and allocation of resources (training area, classroom, instructor, etc.). This training is formally managed to the extent that training evaluation outlines are prepared. A second category of individual training will be termed T_{S2}. T_{S2} is not formally scheduled. It may occur after duty hours, or, at the discretion of the supervisor, may take place during time formally allocated for other activities. For example, a squad leader might excuse an individual from a detail to visit the battalion learning center to study a specific lesson. Or the same squad leader might march the whole squad over to the learning center if the detail finished early and there were still time available during the training day.

For collective training, T_A can also be broken out into T_{A1} and T_{A2}. T_{A1} is used to describe conventional collective training. T_{A1} requires a formal time allocation on the unit training schedule as well as the use of training areas and equipment. The essence of T_{A1} is that it involves use of the actual equipment and troops and is conducted in the conventional manner. Examples of this category include gunnery tables and other live fire exercises. T_{A2}, on the other hand, concentrates on simulation of collective skills either for training efficiency or increased effectiveness. An example at battalion level is use of various simulative games, such as CATTS and CAMMS, to train staffs. Clearly it is not necessary to have troops physically maneuvering on the ground in order to train collective staff skills. Leaders can sharpen tactical skills by terrain walks and tactical exercises without troops (TEWTs). The key here is the transferability of the skills so developed to the task being trained. ARTEPs without troops, currently being developed, are another example. REALTRAIN and MILES are examples of T_{A2} techniques which provide increased effectiveness.

Clearly, individual and collective skills are closely interrelated. By properly selecting collective training events, individual skills are also reinforced. The integration of individual and collective training may be illustrated as shown:



The letter "E" is selected to describe this area of integration to suggest training efficiency. To the extent that training events in the E area are selected, both individual and collective skills are being improved. There is another aspect of use of training time which is included in E. This aspect is the use of unscheduled lapses in collective training time to conduct individual training. Collective training, almost inherently,

has [illegible] periods of time; the higher the level of the training exercise, the more likely it is that at the crew, squad, or platoon level there are periods of inactivity. By anticipating the occurrence of these periods and being prepared to fill them, a unit commander can increase his available training time without expanding the training day.

Individual and Collective Integration (E)

The Army Training Board (ATB) has a project underway to establish the relationship between individual soldier's manual tasks and collective ARTEP tasks. A prototype method for use by trainers in the field has been developed and is expected to be field tested (see Appendix I).

Generally, the prototype method consists of a matrix type array with a series of overlays. The basic layout of the board displays the ARTEP missions from battalion through company, platoon, squad, and individual missions. Displayed in a series of circles are soldier's manual tasks, by MOS and skill level. An overlay or mask is prepared for each mission. The overlay has cutouts which display the mission identification and the tasks necessary to accomplish that mission.

There are some interesting results from this effort. For one thing, training dependencies can be established; that is, some lower skills are prerequisites to performance of higher skills. It also has demonstrated that some skills are common to many missions. These would appear to be key individual skills which would rate priority in the individual training effort. Similarly, some ARTEP missions reflect extremely dense clustering of individual skills; for instance, for ARTEP 71-2, Tank and Mechanized Infantry Task Force, three missions (platoon defense, platoon movement to contact/hasty attack, and squad night ambush) represent the densest clustering of individual skills. These would appear then to be basic missions or keys to other missions. Training on these missions exemplifies the "E" discussed earlier.

In a related effort, ARI is developing at Ft Ord what is referred to as the individual extension training system (IETS). The essentials of the system are development of materials such as task training packages (TTP) which will provide unit leader trainers, such as squad leaders and platoon sergeants, the assistance needed to make the whole SM/SQT system work. The system incorporates what is known to date on task dependencies and work developed within the 7th Infantry Division on "hip pocket" lesson plans.

The Battalion Training Model (BTM) Approach

The theory which underlies the Battalion Training Model (BTM), developed by the Army Training Study, is an extension and expansion of the task dependency concept, and is further related to multiechelon training. The basic purpose of the approach is threefold: to integrate individual and collective tasks in such a fashion as to avoid needless repetition while

providing the necessary reinforcement training; second, to present training tasks in logical, coherent groupings which will serve as an aid to learning and retention; and finally (and following from the first two), to ensure the most efficient use of a unit's training time.

The logic of the BTM approach is based on maximum feasible integration of individual and collective tasks (E) in training to the tasks, conditions, and standards of the ARTEP. That is, individual tasks are grouped into logical groupings that represent basic component skills of collective tasks. Certain collective functions occur in all or many ARTEP missions, and these functions vary little from one mission to the next. Failure to recognize this commonality can result both in overtraining (and consequent inefficient use of training time) and in potential morale problems. A logical extension of the very fruitful ARTEP effort is to break the missions down into collective tasks and aggregate them with selected soldier's manual tasks to exploit integration, thereby reducing the time and dollars required for a particular level of proficiency.

The key to efficient use of available training time is to incorporate the maximum feasible number of tasks, both individual and collective, into coherent packages, incorporating the integration discussed earlier with the multiechelon approach. A further training efficiency can be achieved by matching the echelon of training at which the training is to be focused with the availability of training facilities and with the normal X-Y-Z cycles. For example, such individual skills as "engage target," "move as a member of fire team," "select temporary positions," "move under direct or indirect fire," and "react to obstacles," can easily be trained in conjunction with such integrating, collective subtasks as "target acquisition," "fire, distribution and control," "immediate action control measures," "movement," "dispositions," and "formations." The integration of these individual and collective tasks can be accomplished through fire and maneuver exercises trained at squad through battalion levels. This integration of individual and collective tasks into training at various levels constitutes multiechelon, integrated training.

Battle Drill

A step toward accomplishing this multiechelon, integrated training is use of traditional crew drills. Crew drills were once a way of life in Army training, and still are to a large extent in the weapons systems oriented branches such as Armor and Artillery. The crew drills accomplish two primary purposes. First, each individual in the crew learns his job within the context of the crew task. Second, the drills are standardized so that when a soldier goes from crew to crew or unit to unit, the particular techniques associated with his tasks remain constant. Crew drills thus serve to ameliorate the effects of personnel turbulence by ensuring maximum transferability of previously learned skills. The concept of crew drill can be expanded beyond drills that cover the equipment functions to include tactical actions. Immediate action SOPs for a variety of tactical situations could be developed. For example, the immediate SOP response

to an attack from a flank, or action upon encountering an enemy strongpoint, can be standardized to a large extent. Indeed, they are at present, with the difference that some units with experienced leaders and trainers have developed them far better than others so that there has become little standardization between units. These standardized tactical drills are what in the past have been known as unit "battle drills."

There is a modern day precedent for the use of battle drills. The Israelis have found that the weapons integration requirements both for attack and defense on the modern battlefield are such that most actions from crew to company level need to be practiced as standardized, precisely integrated, coordinated drills. A great deal of the Israeli training effort is devoted to teaching these drills at various echelons of commands. These drills are then put together to match a given set of terrain and enemy situations.

The initial level of these integrated training exercises, or training drills, is focused at the crew/platoon level. These exercises are relatively mechanical repetitive drills. No special terrain or tactical scenario is required. The intent is to develop responsive coordinated actions of individuals, crews, and small units. The limited nature of the training drills makes them adaptable for instruction in the company area, parade ground, or virtually anywhere. The level of instruction is such that it is properly the role of the NCO at crew or squad level to conduct it; more to the point, it is essential that he can be competent to conduct it. Early experience with introduction of IETS at Fort Ord indicated that many NCOs could not perform some of the tasks which they were required to teach their men. Discussions with battalion commanders both in Europe and CONUS indicate that this is not an unusual situation. Thus, at least in the near term, it will be necessary to "train the trainers" as part of implementation of training drills.

By virtue of the fact that the training drills are conducted at small unit level, they are suited to be conducted during Z-time or post support time. Even though the battalion or company may be heavily committed to details, it is still possible to have individual crews and squads available for training on a given day, particularly if the unit is maintaining unit integrity or performing details (that is, performing guard or other details by squad and platoon).

Of particular importance is the multiechelon aspect of integrated multiechelon training. Properly scheduled and conducted, the training drills require virtually no active participation by company commanders and battalion staffs. While the crew, squad and platoon leaders are conducting the training drills (intermittent with supervising details), the staff is free for other activities. From a training point of view, two activities are appropriate. First, while the troops of the battalion are involved in details and training drills, the staff and commanders can train on leader war games such as CAMMS, CATTS, or Dunn-Kempf. Second, the Z-time will

provide the planning time wherein the training managers can lay out in detail the more intensive training activities to be conducted during X-time or prime-time training.

Building on the crew/squad/platoon level training drills, the unit commander can then put the training drills in a tactical environment. He selects the particular drills and tactical situation based upon diagnostic evaluation and command judgment. The focus here is largely on the platoon, and to a lesser degree company, level. These battle drills serve as reinforcement for the crew/squad skills practiced previously. Since more troops are involved and a tactical setting is required, battle drills will normally require more training area than is available in garrison. A local training area or local maneuver rights area in Germany is more appropriate. The concept of the battle drill is to take the basic common individual and crew skills and add to them the nuances and specific techniques necessary to apply the skills in a given tactical environment. For instance, moving in formation can be learned in garrison as part of a training drill whereas moving in formation over a particular type of terrain could be incorporated into a battle drill. It would appear appropriate to plan this type of activity during Y-time or during a back-up post support period. With prior planning, the larger type of unit required--platoon, company--can be made available while others perform details. This level of training calls for a higher degree of officer involvement. At the same time, the officers are focusing on the tactical aspects of the battle drill exercise, crew/squad leaders can follow up and reinforce the individual/crew skills involved.

It is at the company/team/battalion level that the battle drills are put together to form ARTEP missions. The individual and crew training drills are reinforced and supervised at the same level at which they were taught earlier. However, there is a much higher level of officer participation as larger scale exercises are undertaken. The battalion commander would conduct combined arms ARTEP missions representing those conditions which he would anticipate as part of his contingency plans. Likewise, the progression to ARTEP mission would represent a logical continuation of previous training, adding only the mission peculiar modifications to what has previously been learned and reinforced. This simultaneous conduct of multiple subelement actions would thus present training as a mosaic of coherent constituent parts rather than disjointed unrelated pieces.

Decentralization and Flexibility

Based on this background, three fundamentals undergird more effective use of training time: decentralization, flexibility, and integrated training.

Decentralization is essential if training is to be focused on the needs of the individual and if the squad leaders, platoon sergeants and other NCO leaders are to assume their proper role in the conduct of training. The

higher the level at which training is managed and conducted, the more it tends to be "broad brush", responsive to the training needs of some but not others. So long as battalion S-3s and company commanders plan in detail the unit's training program, the NCOs will not enjoy the opportunity or responsibility to train their men. The proper role for company commanders and battalion staffs in a decentralized system is as providers and checkers. Facilities, such as classrooms, ranges, and simulators, require scheduling and management effort if they are to be used efficiently; it would be inappropriate and wasteful to operate a range for a single squad or platoon. Thus, these should be provided for the NCO trainer. Secondly, and in consonance with the basic leadership principle, commanders and staffs need to periodically check the performance of the decentralized training. Particularly as a unit first attempts to decentralize training, there will be those who have a difficult time adjusting and will need help. The focus of the "checking" should be on progress toward goals rather than on specifics of technique.

NCO Responsibility

The basic responsibility for conduct of individual training lies with the noncommissioned officer. Projects like the IETS are underway to assist the NCO in fulfilling this responsibility. TRADOC schools have other helpful projects ongoing like exportable training packages. There are available now, however, materials which will permit the individual to train himself while the NCO supervisor administers performance-oriented testing to check progress. The training extension courses (TEC) lessons are an excellent example. These are "a series of service school produced lessons designed to provide Active Army and Reserve Component commanders with additional capability to upgrade the quality of individual trai g and MOS proficiency in their units. The administrative instructions or lessons provide training objectives and a diagnostic test. Lessons utilize audio-visual, audio only, or written material formats or combination thereof and focus on preparing soldiers to perform specific tasks required by their jobs."[71]

Field Manual 21-6, the field manual on military training, suggests concentration of TEC and related materials in a unit learning center. The 4th Infantry Division has implemented the battalion skill development center (SDC) in conjunction with its NCO MASTER-KEY Program. MASTER-KEY is an acronym for Managership of Soldier Training, Education and Readiness with Knowhow and Excellence Year-round. The program is intended to implement the increased NCO responsibilities for individual training discussed earlier. The SDC is described as an "NCO-operated, one-stop service, training and education activity."[72]

Intertwined with the concept of decentralization is the necessity for flexibility in implementation. NCOs must be prepared to respond to training opportunities as they arise. An enormous amount of potential training time is being lost now because trainers are not oriented toward

taking advantage of those "nooks and crannies" type "E" training opportunities discussed earlier. Rather than rigid adherence to a preplanned detailed training schedule, accomplishment of training goals should be the objective, with squad leaders and platoon sergeants given the flexibility to train toward those goals as fits their particular situation. Establishment of goals and proper preparation of lessons are paramount considerations. Leaders will have to know what performance is expected, and they should be prepared with "hip-pocket" lessons plans, TEC, or whatever is at hand to take advantage of various periods of available training time.

Battle drills, prepared by experienced trainers, would provide the field a means to accomplish the multiechelon, integrated training necessary to achieve the essential level of training readiness. The professional trainers of the training base could develop a series of exercises for use in the field by operating units. These training drills could consist of integrated individual and collective tasks designed to be practiced in garrison. Once these basic skills have been mastered, the unit could progress to field training application, building on a series of battle drills involving squad, platoon, and company exercises. Generally, this battle drill exercise series would be designed to incorporate the latest advances in training technology and engagement simulation, i.e., TEC, REALTRAIN, or MILES. It should be possible to prepare modular, exportable, "how to train" packets to aid the trainer in the unit. This would permit orderly introduction of new training support material to the field. It would also be possible to provide assistance on how to evaluate which is one of the major problems with the present ARTEP. These products could also include an estimate of the resources required to conduct the training and a recommended frequency of repetition normally required to maintain a specified level of proficiency.

The unit training program is designed by aggregating training packets which incorporate individual and collective tasks grouped as integrated training and battle drills. Virtually all training, both individual and collective, is incorporated within these drills as aggregated into ARTEP missions. Training from crew to company level is almost entirely oriented on training drills and battle drills with the sequence selected by the company commander based upon his knowledge of training deficiencies at crew, platoon, and company level. The training program is designed in consonance with the goals and resources specified by the battalion commander.

By careful planning, the unit training program could match the training activity to the unit's X-Y-Z schedule and to the availability of training facilities. Thus, while the unit is on Z time, individuals or crews not on detail could conduct some individual and crew drill, using the motor pool, parade ground, or similar close-in training area. Similarly, during Y time, crews, squads, and possibly platoons could be scheduled to practice training drills or perhaps small unit battle drill if suitable terrain is available. During those periods, the battalion commander and staff

could participate in leader war games such as CAMMS and CATTS, and plan the training for the X period. The suggested time/facility/activity interrelationship is shown in Figure 4-1.

Training Cycle	Training Area	Echelon of Emphasis	Type of Training
Z	Garrison LTA Range	Individual Crew	Individual Crew Drill
Y	LTA LMRA Range	Crew Platoon	Training Drill Battle Drill
X	MTA	Company Battalion	Battle Drill ARTEP

Figure 4-1. Time/Facility/Activity Interrelationship

A particularly important benefit of the use of unit battle drill is the standardization it brings to the training system. As cited earlier, frequently training is subordinated to administrative, logistical, and support demands in the competition for the unit's time partly because the training system cannot specify what its requirements are. Battle drills, coupled with a frequency of repetition for a specified level of readiness, should provide the degree of specificity presently lacking.

It should be kept in mind that any training system the Army employs must be understandable to and operated by the average officer and noncommissioned officer. This is particularly true as the shrinking size of the peacetime Army increases the probability that the officer and NCO involved at unit level might be functioning in jobs one or two grades above their grade. The officer and noncommissioned officer at unit level deserve all the help the Army training community can provide. This should not stifle the initiative or innovation of other commanders. The battle drills incorporate the minimum set of collective skills which the unit would be expected to develop and master to attain and maintain proficiency for the "first" and subsequent battles.

A final point should be made regarding the battle drill exercise series. In order to justify resources for training, the Army should base its estimate on a sound, well-designed training program which incorporates the training efficiencies discussed above. Estimates should be based on a given number of repetitions of specific training and battle drills which is descriptive of what a typical unit with typical turbulence, officer/NCO fill, and nontraining requirements would have to accomplish in order to maintain the desired level of training proficiency. This is not to be construed as a directed, prescribed training program which the commander in the field

must follow in a lock-step manner. To do so runs counter to the ARTEP philosophy and negates the value of TRADOC advances in training technology.

To properly tailor battle drill exercises for the training needs of his unit, the battalion commander will need to schedule frequent (perhaps quarterly) diagnostic ARTEP evaluations at battalion level. In this way, he will be in a position to adjust the training program for the coming quarter by selection of the appropriate training drills/battle drills to remedy specific weaknesses disclosed by the ARTEP.

Sustainment Frequency

Periodic sustainment training creates the image of "event driven" training, but there are several important differences. The frequency for diagnostic testing would be determined through systematic techniques and not be arbitrarily selected. The battle drills are carefully designed to include the critical tasks which the unit must be able to perform to be successful in combat. Finally, there is nothing inherently wrong with peaking for periodic training events, so long as there is a system to ensure that a reasonable level of proficiency is maintained between events.

A next question to be examined is how to determine the recommended frequency of repetition. In theory, this should be determined based on two factors: collective "forgetting" time and turbulence. Theoretically, one could determine how often a given task must be performed based on a decay curve for an average crew. As discussed earlier, there is truly no such phenomenon as group learning, and very little has been done in a theoretical vein in terms of relating group performance (which does exist and is measurable) to individual learning and forgetting curves. Repetition would also be related to turnover of unit members. Because new people have to be incorporated into squads and platoons, some data is available on turbulence. At the outer limit, a task would have to be repeated at least as often as the unit experienced 100% turnover. But obviously this would be gravely inadequate because within that 100% are key individuals in leadership positions whose loss would clearly have a marked effect on the group performance, similar to a football team losing its quarterback. Thus, one means of using turbulence data would be to use the turnover rate of key individuals as the measure. But this too would be only a partial answer to the question of frequency of repetition. In the "real world," the practical thing to do is to assume a frequency of repetition and adjust it based on experience. This is in essence what some units are doing now.

ARI-Heidelberg, in research sponsored by the 7th Army Training Command,[73] is in the process of developing a training model that incorporates many of these same thoughts. To quote the system description:

> "The model proposes that individual and unit sustainment training requirements be developed by the battalion

that are tailored to its mission and function. These would be stated in terms of standards of performance (based on Soldier's Manuals and ARTEP to the extent possible) and the frequency (i.e., monthly, quarterly, semi-annual or annual) that each area needs to be tested...the initial estimates of required sustainment standards and frequencies for an infantry battalion are currently under development."

The ARI model is keyed to a diagnostic testing cycle. The cycle the model proposes is shown in figure 4-2 below:

	AVERAGE/QUARTER	ANNUAL
Bn FTX/CPX	4	16
Co FTX	6	24
Platoon	4	16
Squad	4	16
ARTEP Prep		3
		75

Figure 4-2. Unit Sustainment-Time Guidelines

At least one unit has gone further in relating frequency to ARTEP tasks. The commander of the 1st Battalion, 54th Infantry, 1st Armored Division, has developed a training program which specifies for his staff and company commanders the frequency of training by ARTEP task.

Diagnostic Testing

The foregoing discussion leads to an important aspect of building on battle drills. The cycle for repetition is built around diagnostic testing to provide the commander the necessary feedback to know points of emphasis for the next cycle. For the combat arms there are technological developments which make the conduct of this diagnostic testing even more meaningful. The TRADOC Systems Manager for Tactical Engagement Systems (TSM/TES) is presently engaged in integrating tactical engagement simulation into the ARTEP. Engagement simulation provides hard data results rather than subjective evaluation. More importantly, it provides in the after action review specific information as to why things went wrong.

This leads to another important characteristic of engagement simulation which could hopefully be extended to all diagnostic testing of all collective training. That is, that the collective evaluation process would point up individual training shortfalls which could be remedied on the spot. Coupled with the products of the IETS project, remedial instruction could be given immediately after the review while troop experience is still fresh. This situation represents the essence of accomplishing integrated training.

Beyond the skills evaluation aspect of engagement simulation, and

perhaps more important, are the team building-aspects of conducting experiential training in a competitive situation. The American soldier likes to be challenged and he likes to compete. Performance leads to confidence, and confidence leads to better performance. "Probably (the) most important (learning principle of REALTRAIN) is that the competitive nature of REALTRAIN exercises provides the motivation to learn, an element often lacking in Army training. Because men in infantry and armor units see that these exercises are training them to do the job they will be called upon to do in a combat situation and because the exercises are an interesting departure from conventional training, they have consistently shown a desire to learn."[74]

Of 45 participants in a REALTRAIN exercise in USAREUR, 86% felt the exercises increased their tactical proficiency; 74% said they like the exercises. More to the point, the troops' perception of their unit's state of training improved markedly as a result of REALTRAIN exercises as shown in Figure 4-3.[75]

Application of Battle Drill Exercises

The use of battle drills, particularly when linked with experiential training, provides for more than simply a means for maintaining training proficiency. It may be used with some sort of external evaluation to provide an index of training readiness.[76] One of the causes of dissatisfaction with the ATT as a measure of training proficiency was its lack of objectivity. Engagement simulation provides hard data. In addition, by concentrating on certain tasks, the number of objective measures could be expanded. For instance, the time length of radio traffic could be recorded or perhaps categorized to establish effectiveness of communication. Conceptually this could be related to a standard.

The battle drills provide a focused approach to teaching new personnel the critical essential skills for a job in the minimum training time. For instance, they could be used to integrate new personnel into a unit rapidly. With minimum preparation time, replacements could begin developing experience in squad and platoon SOPs. The training would also highlight for the squad leader the individual training weaknesses on which he could then concentrate. This approach could be extended to include cross-training of team members in the jobs of other team members, and cross-over training of support personnel into critical combat skills which they may be required to develop in combat. In theory, and the actuality will have to wait until more is known about learning curves, there may be some minimum sustaining level of combat arms training that support personnel need to receive periodically which could shorten the train-up period.

An interesting and potentially valuable variation on the use of experiential training techniques for rapid train-up is that a simulation could be developed and specifically tailored for a given war zone.

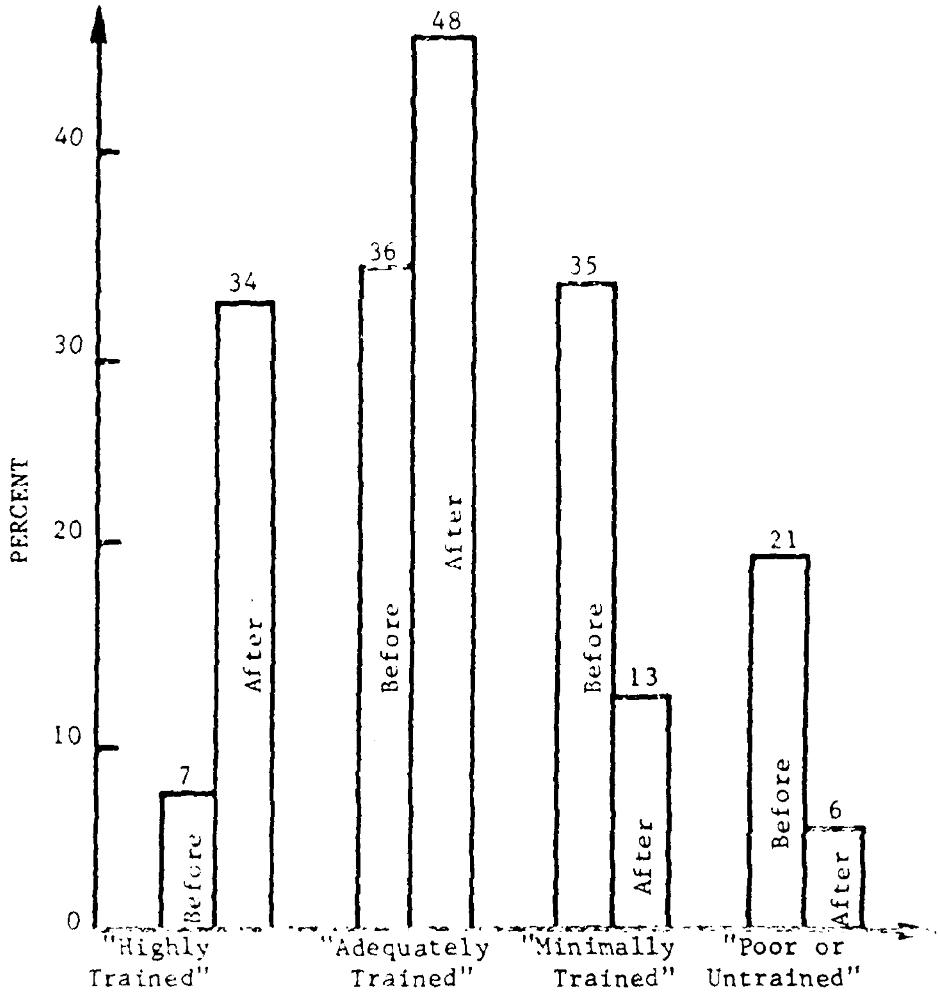


Figure 4-3. Trainees' Perception of Units State of Training Before and After REALTRAIN [77]

"Acceleration of troop training should be wholly feasible. We know the core abilities required for each soldier to perform successfully in combat; however, we have not applied the instructional advances made in recent decades. For example, knowing the skills required within a successful infantry platoon, we should be able to create in time of peace alternative simulation environments such as airmobile infantry/insurgency/jungle or mechanized infantry/mid-intensity/desert. In time of war requiring reinstitution of the draft, and knowing the location and nature of the conflict, draftees would be prepared primarily for that conflict. Draftees could learn such basic knowledge as use of weapons, patrolling, and first aid as members of platoons in a simulation environment."[78]

Similarly, this approach could be used for reserve units prior to deployment.

Another potential application of the crew/training/battle drill is as a means to train the basic operating features of unfamiliar items of equipment. This has utility for both interoperability training and the situation where a unit trains on one type of equipment but would use another in combat (e.g. a potential situation with the XM-1). The first situation would require modification of the ARTEP event to incorporate the pertinent aspects of the foreign tactics, organization, techniques, etc. In this regard, practice of the battle drills could serve as a diagnostic tool to highlight critical areas for resolution. In the latter case, the battle drill would provide a focused set of combat critical tasks on which the crew would concentrate its training. Diagnostic testing of this concept might provide some valuable fall-out; there might, for instance, be certain preliminary individual training that is peculiar to the new item of equipment.

This battle drill exercise series would provide a logical program for the unit which might find itself stationed at a post with severely restricted maneuver area and with its tanks and APCs located some distance away where more maneuver space is available. Local training areas could be utilized, perhaps with SCOPES and REALTRAIN, for squad and platoon training, progressing to company and larger unit training, using MILES, on a recurring basis and when the larger maneuver area is available. This could be further extended to a periodic training period in a highly intensive replica of the modern battlefield at a National Training Center.

Summary

Unit training consists of training, both individual and collective, that is conducted in the unit. Unit training is primarily collective training. Unit individual training focuses on the individual skills not trained in the training base, and refresher training on those that are.

The starting point for unit individual training is the soldier's manual, which specifies the critical individual tasks a soldier of a given MOS and skill level is expected to perform. The skill qualification test (SQT) is administered biannually on selected soldier's manual tasks. The NCO supervisor is expected to administer periodic SQT type tests to determine the training status of his people. The commander is concerned with individual training in that the SQT is linked to promotion, turbulence necessitates cross-training on individual skills, and collective performance is largely dependent on individual performance.

Collective training is training of groups of individuals (crews, teams, or squads). Virtually all collective training is done in the unit. Equipment-oriented, collective training focuses on efficient operation of equipment. Tactical collective training is dependent on terrain, weather, and enemy situation.

The starting point for unit collective training is the Army training and evaluation program (ARTEP). The ARTEP is intended to describe the minimum set of mission capabilities for the unit. There is, at this point, no collective equivalent to the SQT.

The training time available to the unit, T_T, can be divided into time spent on individual training, T_S, and time spent on collective training, T_A. Collective training time T_A may be subdivided into two subcategories. T_{A1} is used to describe conventional collective training using training areas, and ranges, while T_{A2} describes simulative collective training using war games, TEWTs, and other techniques.

Individual training, T_S, may be subdivided into T_{S1} and T_{S2}. T_{S1} is formally scheduled individual training while T_{S2} is unscheduled and takes place at the initiative of the individual or his supervisor.

Some types of training simultaneously mutually reinforce both individual and collective skills. This training is referred to as integrated or "I" type training which occurs in basically two ways. One type involves filling in the inevitable lapses in collective training time. The other consists of utilizing a system of training exercises in which the collective training builds on and reinforces individual training.

The unit commander can increase the efficiency of his unit training time by maximizing T_{S2}, concentrating T_{S1} on critical individual tasks, and basing collective training on integrated, multiechelon, battle drill training exercises.

TRADOC could design unit battle drill training packets with the frequency of repetition and resources required. This would establish a resource tie to training proficiency comparable to that already present in the maintenance system.

Engagement simulation, such as SCOPES, REALTRAIN, and MILES, could be integrated with diagnostic testing to point up training weaknesses, both collective and individual. The competitive, team-building aspects of engagement simulation also offer morale and motivational benefits. In addition, it encourages leader innovation.

Potential applications of the unit battle drill include:

a. Use with an external evaluation system.

b. Integrating and training new personnel, either for replacement training, cross-training, or familiarization training.

c. Interoperability training and training on unfamiliar equipment.

d. Training in areas or units with equipment and space restrictions.

APPENDIX

US Army Training Board
Background Paper #1
The ARTEP/Soldier's Manual Interface

Introduction

In early 1976 it became apparent that the Army's training managers in the field, especially those at battalion level, were having difficulty managing the outpouring of new training aids, devices, publications, and literature. Concurrently, these same battalion training managers were trying to digest and adjust to the new and radical changes to training brought about by the ARTEP and soldier's manual (SM), commander's manual (CM), and skill qualification test (SQT). The philosophy behind these publications represented a significant increased shift of the responsibility for individual soldier training from the training institution to the soldier's unit. The battalion training managers, trained to think in terms of their responsibility to plan and conduct collective training, were having a great deal of difficulty managing the increased load of individual training responsibilities. They had been trained to think of individual and collective training requirements as unrelated and independent. In fact, many training managers regarded individual and collective training requirements as mutually exclusive competitors for the same scarce training resources. Some were critical and resentful of the individual training requirements because these requirements were "new" and detracted from the already limited time available to conduct collective training. The battalion training managers were like jugglers with two separate balls in the air, one collective training and the other individual training. The choice of which ball a manager threw depended upon the next pressing training requirement he had to meet. An approaching ARTEP or FTX meant collective training was emphasized, while at SQT or EIB time individual training got priority. And of course, lurking in the background was that unpredictable thing called "command emphasis" which shifted from individual training to collective training and back again with each new batch of guidance from higher commanders.

Concept Development

As a result of numerous visits to the field, the dilemma faced by the training managers became evident to the Army Training Board (ATB) (formerly the Combat Arms Training Board). It was clear that a way to make the job of training management in units easier had to be found. The board began to work through a logical thought process to address the problem. It began with the basic concept that the foundation of the Army's training philosophy was the concept that tactical training was based on the "How to Fight" doctrine. The ARTEP's developed by the schools should then provide

the method of training and evaluating each unit in the performance of its collective mission in accordance with the applicable "How to Fight" doctrine. It followed that the individual training of the soldiers in the unit must contribute to the overall collective mission of the unit. It appeared to the board that there was therefore a direct correlation of individual training to collective training. Intuitively it was sensed that such a relationship existed, but proving and logically demonstrating its existence was a different matter. Having decided that the ARTEP was the cornerstone for collective training, it followed that the baseline for individual training in units had to be the soldier's manual. The entire individual training plan for the life cycle management of individual training developed by proponent schools was based upon the tasks contained in the SM. It was decided to take the two base documents of training, the ARTEP and the soldier's manual, and 'bump' them against one another. For a variety of reasons, not the least of which was the previous experience of the board in the combat arms area, ARTEP 71-2 "Combined Arms Task Force" and the critical combat MOSs--11B, 11C, 11D, and 11E--were selected for the model. Each mission in the ARTEP was analyzed by a study group of experienced combat arms officers from the board, the Armor School, and Infantry School. Initially, only the lower skill levels were included, but the model was soon expanded to cover skill levels one through four. The study group went through the appropriate soldier's manuals and determined which SM tasks were required to perform which ARTEP mission. As the analysis continued and each ARTEP mission was laid out with its related SM tasks, some very interesting things started to appear.

First, it was clear without a doubt that not one, but a series of relationships or interfaces existed between individual and collective training. Second, a complex set of relationships existed between the individual tasks themselves. The study group began to see that a hierarchy of individual tasks formed component parts of other tasks. It soon became clear that some elementary tasks had to be done first in order to accomplish the higher order task. Another interesting fact was found; some individual tasks appeared in more than one ARTEP mission, and among these some tasks occurred more frequently than others. This was found true in both the same level missions, (i.e., all company missions) or across the spectrum of unit missions (at all levels) from squad to battalion. Each MOS selected was laid out so that the full range of individual tasks by MOS and skill level was brought together in each ARTEP mission. In this way the group could see the full relationships between tasks of different MOSs and between individual tasks and each collective mission. Of all the relationships identified and explored, two held out the most promise for the training manager. First was the discovery and identification of "high frequency" individual tasks. These were tasks which appeared in 80% or more of all ARTEP 71-2 missions, no matter what the unit size. This was valuable to the trainer because it provided him with some logical criteria for selecting what he was going to train. Based upon his evaluation of what individual and collective training his unit needed, the training manager could select the ARTEP mission(s) which included a high density of th-

individual tasks for which he wanted his soldiers to train. Conversely, the training manager could elect to train on individual tasks which had a high frequency in ARTEP missions that he felt were important. In either case, the training manager is able to have his unit simultaneously training for both individual and collective training requirements. This translated into a major savings in training time, resources, and effort, and hopefully led to carefully thought out training plans which fully integrated the two types of training.

The second collective/individual training relationship of value to the training manager was the identification of the hierarchy of individual tasks by skill level in each ARTEP mission. The training manager could use this hierarchy to identify which individual tasks in a given ARTEP mission he should train for at each level, and how the tasks at a lower skill level contributed or were linked to the next higher level.

By the end of the study, the group had discovered that individual training and collective training were not two separate balls to be juggled about arbitrarily, but rather two inseparable elements of a single ball whose use had to reflect unit training needs rather than haphazard guessing.

ARTEP/SM Interface-Template Prototype

Having established the existence of the interface, some method had to be found to explain it to the field in a clear, understandable manner. After some experimentation, a device was developed which utilized a series of heavy paper template sheets overlaying a base sheet. Each of the template sheets represented one of the ARTEP missions, and each had a series of holes cut in it in appropriate locations to represent the individual SM tasks. The base sheet had all of the SM tasks arranged on it in a predesigned manner. When one of the template sheets was placed over the base sheet, the SM individual tasks for that ARTEP mission would show through the holes in the template. High frequency SM individual tasks could be identified by overlaying several of the template sheets simultaneously. The SM individual tasks that showed through all sheets were those common to those ARTEP missions. As the templates were refined, other information was added to each sheet to assist the training manager. In addition to the individual soldier tasks, each ARTEP mission was analyzed to determine what tasks were required of the leader at that level. For example, a platoon ARTEP mission was analyzed to identify what leader tasks the platoon leader had to perform to complete successfully that mission. This information enabled the training manager to organize better the training to make full use of the multiechelon training concept. His leaders could be training on their leadership tasks while the soldiers trained for their individual tasks, all for the same ARTEP mission.

ARTEP/SM Interface - Refinements

Even as it was being produced, the ARTEP/SM prototype template was looked upon as an interim device. Although it gave a good visual representation of the interface concept, it was bulky, awkward, and it was definitely not field-proof. In addition, the concept of the template was being expanded to include more information than just the ARTEP/SM interface and leader tasks. It was seen as an opportunity to give the training manager a more complete package of training information for each ARTEP mission. As a consequence, the physical layout of the device changed from a large template sheet to a printed page. As with the template, the printed format addressed each ARTEP mission separately. On the printed pages were listed all of the high frequency, SM individual tasks plus those individual tasks that were not high frequency but were unique to the specific ARTEP mission: leader tasks for each mission; training tips for the trainer and manager; and references for more detailed, specific information. Put together into a single handbook, this information gave the training manager what he needed to know in order to plan and manage a comprehensive individual/collective training program in his unit. In addition, it gave the trainer many insights into what tasks should be selected for training.

Uses of the Interface

Whatever its physical format, the ARTEP/SM interface provided the training manager with a valuable management tool. It provided a variety of information and could be used in several ways.

First, the interface identified high frequency, SM individual task which were common to a great number of all missions in the ARTEP. As previously discussed, this permitted the training manager to meet individual and collective training requirements simultaneously. By selecting and training for a specific ARTEP mission, he could train for identifid SM tasks. The reverse was also true. By training for certain high frequency SM individual tasks, the training manager was also training his unit to perform certain ARTEP missions.

Second, the interface showed the existence of individual task training dependencies. This permitted a logical selection of what individual tasks were to be trained first or simultaneously. It gave the training manager a way to diagnose any weakness in individual task performance by selectively testing the subordinate individual tasks that contributed to the weak task. Once he isolated the specific subtask or tasks that were causing the unsatisfactory performance, he could design the training program to correct the weak area.

Third, the interface helped the training manager to structure his unit internal ARTEPs and ARTEP evaluation to target weak training areas, and to better analyze the results to identify specific individual task or collective missions for further training.

Fourth, by listing leader tasks along with the individual SM tasks by skill level, the interface assisted the planning and conduct of related multiechelon training for each ARTEP mission. The soldiers could train on their individual tasks, the leaders at each level could train on their leader requirements, and the training managers and supervisors had logical "test" points to check on the effectiveness of the training. This was true decentralized multiechelon training.

Fifth, the interface helped the less experienced trainers to understand the importance of certain types of training. For example, weapons-related individual tasks were among highest frequency tasks throughout the ARTEP. This clearly demonstrated the critical nature of weapons training and the key role it played in successful collective training.

Finally, the interface let the training manager select and highlight any special individual tasks that he felt were important for such things as SQT, EIB, etc. Identification of these tasks, and the ARTEP mission(s) to which they were related permitted the training manager to emphasize those tasks by training the appropriate ARTEP mission(s). This accomplished the same thing as with the high frequency tasks--simultaneous training for individual and collective training requirements.

Conclusion

The Army Training Board feels that the development of the ARTEP/SM interface concept, whatever its physical format, was the key that unlocked the door to a rational battalion training management system. The shift to the printed page format, and the inclusion of the additional training information makes the interface a much more useable tool. Ultimately, the board sees its transformation into a type of "how to train" book. The process of refinement is not finished. Users of the interface are strongly encouraged to modify it, change it, expand it to better fit their own needs, and share their experiences with the rest of the Army by keeping the ATB informed of the lessons they have learned.

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TRAINING PROFICIENCY, READINESS AND COMBAT EFFECTIVENESS

by

Major David S. Blodgett

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

A peacetime army has one legitimate function. It must maintain the ability to complete successfully its war-time mission. By so doing, the reasons for having an army are fulfilled. An army serves as a deterrent and, when deterrence is no longer viable, achieves the nation's goals by force. An army's sole reason for being is to fight the nation's war. Any addition to this basic task should be undertaken only after due consideration of its effect on the army's war-making capability. This implies the ability to assess accurately the present and future requirements for conduct of land warfare in terms of the capabilities of potential adversaries. It further implies the ability to determine the army's combat effectiveness: its capability to succeed against those adversaries. Finally, there must be a means to discern and articulate the manner in which noncombat activities or resource changes affect combat effectiveness.

The US Army today does not have a mechanism for translating changes in training resources into changes in combat effectiveness. This lack makes it virtually impossible to project changes in training resource requirements necessitated by changes in the capabilities of potential adversaries or in contingency scenarios. On an even more basic level, it is not possible to translate increases and decreases in military budgets, manning levels, and noncombat commitments into changes in the Army's ability to win in combat. This inability leaves the Army extremely vulnerable to resource reductions during periods of pressure on the Federal budget. The inability to link resource levels with combat effectiveness, and the resultant inability to articulate resource needs to our civilian leadership, place the Army at a severe disadvantage when all governmental programs are under severe budgetary pressure. The Army cannot communicate the impact of proposed resource reductions when neither the actual resource requirements nor the present capability to win a war are known. Training resources in the Army have been under pressure from various sources in recent years. There is no mechanism for supporting subjective estimates of increasing danger with solid analytical effort.[1] As a result, we have not been able to clarify for ourselves, nor to communicate to others, the impact of various budget cuts and personnel programs. This paper develops the concepts of combat effectiveness and training proficiency with emphasis on their interrelationships. It then proposes a method to improve the Army's ability to evaluate training proficiency and relate it to combat effectiveness.

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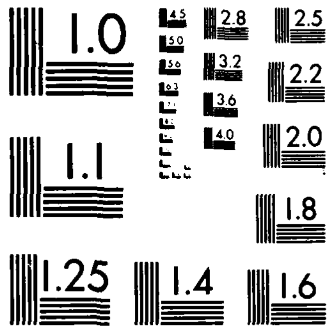

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

This is a fascinating and elusive problem. Both combat effectiveness and training proficiency stubbornly resist quantification. There is considerable room for debate regarding the conceptual components of each. Considering the nebulous nature of the basic concepts, it is not surprising that there are serious difficulties in translating statements of training proficiency into measures of combat effectiveness with sufficient rigor for the Army's leadership to make confident decisions.

This paper begins with a discussion of the concepts pertinent to combat effectiveness and training proficiency. Recent developments in training enable the Army to view training proficiency in combat-referenced terms which cause measures of training proficiency to be very close to statements of combat effectiveness in, and of, themselves. Chapters on individual and collective training proficiency develop these subjects by describing their evolution, the underlying training philosophy, and the current status of the skill qualification tests (SQTs) and Army training and evaluation programs (ARTEPs). Each is addressed in terms of its utility as a measure of training proficiency.

Various measures of combat effectiveness in use today include internally generated reports and inspections by outside evaluation teams. The most prominent of these are presented with emphasis on the Army's unit readiness reporting system (URR). This leads to the development of an expanded concept of combat effectiveness which is expressed in terms of six components.

The expanded concept of combat effectiveness forms the basis for a proposed system for measurement of training proficiency and verification of combat effectiveness. The proposed system answers the Army's needs and permits a clear, concise picture of combat effectiveness as influenced by training proficiency.

CHAPTER II

CONCEPTS

Combat Effectiveness

A unit's combat effectiveness can be defined as its ability to accomplish its designed mission in a combat theater. This definition includes the full range of units from those which participate directly in combat, such as Infantry battalions, to those combat service support units which are habitually located far to the rear and whose combat functions differ very little from their peacetime activities.

There are three distinguishable aspects of combat effectiveness. First, can the unit complete its assigned tasks? For example, can the tank battalion secure its objective? Is the bridge company capable of installing a floating bridge? Can the Signal battalion maintain effective communications? While mission accomplishment is the most important, the other two cannot be ignored. The second aspect involves efficiency of resource employment. How effectively does the unit employ all its available resources? Are operations conducted so as to minimize casualties and avoid unnecessary destruction of equipment? Does the unit keep itself in the best possible condition to conduct continuous operations? The third aspect of combat effectiveness is the use of time. Does the unit do its work as quickly as possible in the context of the other two aspects? Although time should be regarded as a resource, it is unique. Time alone cannot be conserved or stockpiled. The ability to make effective use of the available time or to deny one's adversary the time he needs is an art in itself. Combat effectiveness can be described as the ability to accomplish assigned tasks with appropriate conservation of resources and within a reasonable amount of time.

Threat-Oriented Criteria

Measures of combat effectiveness must be referenced to the battlefield and the enemy which will shape the combat environment. The Army has focused its attention on the potential battlefield in central Europe. While this may not be the most probable conflict scenario, it is the most dangerous. Of all possible locations, should war break out in Europe, the results could be the most serious for the Nation. There will be less preparation time in that theater than anywhere else. War in Europe would be very sophisticated. The vastly increased capability of modern equipment

carries a cost in complexity and imposes high demands on the skill of the individual soldier. Increased range capability extends the gunner's world to the very limits of human sight. Improvements in night vision equipment enable forces to fight a 24-hour-a-day war with, in some respects, a better capability to identify targets at night than in the daytime.

The potential enemy is superior in numbers of personnel and equipment. His equipment is qualitatively equal and, in some aspects, superior to ours. He can rapidly mass his forces at a time and place of his choosing to achieve a local superiority of 6-to-1 or greater.

All of this implies that the US Army must be able to react on very short notice and fight on a battlefield which demands near perfect performance. Success on this battlefield requires that the Army possess a very high level of proficiency in everything it does.

Measures of combat effectiveness must be referenced to this battlefield and threat. They must describe all of the characteristics and components of a successful force and must be couched in terms which are meaningful and useful measures of the Army as it actually exists. When the Army can establish the training proficiency required for combat effectiveness on that battlefield and evaluate the proficiency level of specific units, it can determine the resources required for achievement of the necessary proficiency standards.

This concept is essentially the same for Active and Reserve Components. The primary differences are their relative starting points in terms of proficiency and personnel. With the exception of the combat service support units which will deploy immediately, Reserve Components will have a somewhat longer time to deploy. In addition, these later deploying units will enter a mature battlefield in which the environment and threat are somewhat different from that first encountered by the Active Components.

Training Proficiency

Training proficiency is the degree to which the Army possesses the individual and collective skills required to maintain a winning capability. At the individual or crew level, this proficiency implies the capability to employ weapons to the limits of their design capabilities.

The proficiency of either individuals or units is dynamic. In the peacetime Army, numerous housekeeping and administrative activities detract from the time available for mission training. Proficiency rises and falls in a positive relationship with the time and other resources available for mission training. Training proficiency changes in a cyclical pattern. The depth of proficiency decay is affected by the length of time between training periods, the nature of previous training, and the decay characteristics of particular skills.

In theory, the requirement is to match the composite of all essential skills against a projection of the training time and resources available between alert notification and the actual entry into combat. Proficiency must be sustained at such a level that, in the time available, it can be brought up to a level consistent with success on the battlefield. At present, this is only theory. The Army has neither the measurement tools nor the detailed knowledge about proficiency curves to put the theory into practice. The groundwork, however, has been laid. The acceptance of performance-oriented training concepts and the evolution of training theory and technology have placed the Army in a position where it can, for the first time, become very specific about what skills can and must be retained at specific proficiency levels to be successful on the modern battlefield.

Performance-Oriented Training

Recent developments in training philosophy and support material have placed the Army in a position to reevaluate its entire approach to the measurement of training proficiency. The philosophical changes have had the greatest impact even though most of the changes are simple common sense. Thoughtful trainers have always supported the ideas contained in the "new" philosophy. Until recently, however, the Army has not institutionalized these ideas. The acceptance of performance-oriented training as exemplified by the introduction of the soldier's manual (SM), skill qualification test (SQT), and Army training and evaluation program (ARTEP) provides an opportunity to be very clear and objective in the assessment of combat effectiveness as influenced by training.

The characteristics of performance-oriented training are summarized in the test edition of FM 21-6, "How to Prepare and Conduct Military Training."

> "The crucial first step is to continually remember the purpose of training: Preparation for performance....
>
> The performance-oriented approach to training, as outlined throughout this chapter, facilitates--even forces--clear and precise thinking about training as preparation for job performance. This clarity and precision results from the structure and content of training objectives.
>
> It is but a slight exaggeration to state that the performance-oriented approach begins and ends with the training objective. For a given skill, a properly structured and completed training objective is both the training and the test....
>
> TRAINING OBJECTIVE = TRAINING = TIME = EVALUATION

...a properly constructed training objective consists of three elements:

1. Task to be performed.
2. Conditions of performance.
3. A training standard of acceptable performance."[2]

By focusing on performance-oriented training, the Army has adopted a philosophy of clearly stating what an individual or unit is expected to do, under what conditions, and to what standard. If performance matches the standard, the training goal has been met and the desired level of training proficiency has been attained. The Army trains to the test and evaluates its proficiency using the training standard as the yardstick.

Measurement Requirements

The performance-oriented approach to training emphasizes the need for performance measurement. Once a performance standard has been set, it is necessary to make periodic assessments of how closely performance matches the standard. This is to diagnose trouble spots and identify areas for further training. Without such periodic checks, the trainer has no means of knowing if the standard has been met.

The same can be said of combat effectiveness. The standard has been set--success on a future battlefield. Enough is known about that battlefield to state the tasks which will be required for success, the conditions under which they must be completed, and the standards of performance. The Army cannot know where it stands in relation to those standards unless it periodically verifies its performance capability. Such periodic assessments provide essential input to decisions regarding force structure, doctrine, and contingency planning.

Measurement is necessary to create an atmosphere of excellence. Soldiers thrive on the opportunity to demonstrate their skills when they have clearly defined tasks which they understand, an opportunity to develop the requisite skills and the knowledge that they will be given the opportunity to demonstrate their ability in a test which they trust. Given such a situation, one of the natural characteristics of the American soldier will come into play. He will find an infinite number of ways to perform well. The Army must capitalize on this ingenuity and devise tests which are sufficiently like combat that success on the test entails doing things which spell success in combat.

We have a highly competitive Army whose leaders succeed by demonstrating excellence in the areas where performance is required. When all the things which need to be done exceed the resources available to do them, the successful leader will devote his resources to the areas where outstanding performance is rewarded, permitting other things to be done less well with the resources left over. This competitive attitude is one of

our national strengths. It must be emphasized and encouraged. The corollary is that the performance requirements must place emphasis on those things which will win wars. It is unacceptable to permit a set of de facto priorities to emerge based on piecemeal application of inspections or evaluations of peripheral matters. By judicious application of performance measurement on the things which truly determine combat effectiveness, the Army can establish an environment which capitalizes on our strengths to build a truly effective fighting force.

Finally, performance measurement and verification are necessary to determine resource requirements. It is impossible to know how much is needed, in terms of people, dollars, and time, unless the actual capability of the Army is compared with the capability required for victory.

CHAPTER III

INDIVIDUAL TRAINING PROFICIENCY

Background

For almost 20 years the Army's individual evaluation instrument was the annual Military Occupational Specialty (MOS) test, a normative-referenced, knowledge-based, 125-question multiple choice test. MOS test scores, coupled with the individual's enlisted evaluation reports, were key factors in guiding proficiency pay (1959), verification of primary MOS (1961), verification of secondary MOS (1964), and promotion (1968). The evolution of Army thinking with regard to training and evaluation led to dissatisfaction with the MOS test for several reasons.[3]

The test was built on the assumption that if a soldier displayed knowledge about his job, he could do his job. The test covered all the duty positions within an MOS and skill level although the soldier, through no fault of his own, may have had job experience in only one duty position. A certain level of reading ability was required for success in the test although a comparable reading ability may not have been required for actual performance on the job. Being a four-response, multichoice test, at least 25 percent of the scores could be attributed to random guessing.

To meet the personnel management system's needs for a broad distribution of tests results, the test item developer was increasingly driven to devise questions about peripheral job knowledge. While this yielded highly discriminatory test results for measuring a soldier against his peers, it moved away from measuring the soldier against his job. Test writers tended to go farther and farther afield to discover the esoteric knowledge buried deep in the technical manuals, and any possible correlation to critical job requirements was lost.[4]

A New Approach

The dissatisfactions with the MOS test led to development of the skill qualification test (SQT) and soldier's manual (SM). The SQT is a dual-purpose instrument which serves both trainers and personnel managers. The soldier's manual describes the tasks which job incumbents or aspirants are expected to perform. The task descriptions include the conditions under which the task is to be performed and the minimum acceptable standards of performance. SQTs are tests of task performance extracted from the

appropriate soldier's manual on a sampling basis.

The soldier's manual and SQT represent the institutionalization of performance-oriented training for individual soldiers. These documents, and the administrative system which supports them, establish a framework which can develop into a comprehensive, objective training and evaluation system for individual soldiers' skills.

> "The Skill Qualification Test is different in that the test moves away from just measuring what a soldier knows about his job toward measuring how well he can actually do the tasks in the job. The Skill Qualification Test is intended to be a measure of performance not knowledge.
>
> One of the central problems with the MOS test was that evaluation of a soldier was largely based on the comparison of his score with the scores of other soldiers taking the test. If a soldier's MOS score was higher than other soldiers taking the same test, the soldier was considered to be a superior soldier, even if the entire group of soldiers did poorly on the test. This type of evaluation allowed soldiers to maintain a low level of proficiency but still get by simply because other soldiers were less proficient.
>
> When a soldier is evaluated using an SQT, his score is compared with a fixed standard of performance. The standard requires all soldiers who take that SQT to perform critical tasks taken from the Soldier's Manual (SM). These critical tasks are required to survive on the modern battlefield or to contribute to completion of the unit's mission. With this type of evaluation, no soldier is judged to be proficient unless he can reach or surpass the fixed standard."[5]

As a result, for the first time the Army can measure a soldier's ability to perform his job against the proficiency needed to perform in a combat situation. In other words, if a soldier achieves the standards specified in a properly designed skill qualification test, he has the training proficiency to be effective in combat.

SQT Development

The Enlisted Personnel Management System (EPMS) divided the enlisted structure into five skill levels:

ENLISTED GRADE	SKILL LEVEL
E1-4	1
E-5	2
E-6	3
E-7	4
E8-9	5

Figure 3-1. Enlisted Skill Levels

This standardization divided enlisted careers into five roughly equivalent time blocks and brought visibility to the distinct differences in the duties of each of the noncommissioned officer middle grades. It was then incumbent on TRADOC to describe those distinct differences between enlisted skill levels in each MOS and to develop coherent career progression training programs for each. As with any large program, the transition has experienced growing pains. The development of soldier's manuals required a complete analysis of every MOS and job, a gargantuan task which exceeded the available resources.

The inevitable result was that the tasks selected for first generation soldier's manuals were often less than perfect. Decision rules were soft. Many tasks were not stated in behavioral terms. In spite of these flaws, soldier's manuals represent a major improvement in communicating to the soldier what the Army expects of him.

Since they are extracted from the soldier's manuals, the SQTs can be no better than their parent documents. As a concept, SQT answered many, but not all, of the Army's dissatisfactions with the earlier MOS tests. Early in SQT development, the goal of testing a duty position within an MOS and skill level (11B5 E8 First Sergeant or Operations Sergeant) was abandoned. Duty position specificity was too complex for an embryonic test system. Frequent transfer of incumbents between duty positions was a fact of life and very likely a legitimate need of the Army. Current SQT development does include some "tracked tests." The number is expected to increase over the next few years.[6]

The resources required by a pure hands-on testing approach are excessive. This led to the expansion of the test to three components: hands-on, written, and performance certification. The performance certification component requires commanders to certify whether an individual has performed certain soldier's manual tasks to standard within the preceding 12 months. The written component is intended to focus on elements of tasks that are performed in a "written mode" such as filling out a form, or which can be performance-oriented even though they are carried on a paper medium. An example is the identification of enemy equipment from visuals. The need for machine scoring of the test reintroduces the multiple choice format and the opportunity for some successful guessing, although of much reduced dimensions.[7]

With a maximum SQT score of 100, soldiers are classified based on their scores:

- 100-80: Qualified for promotion to the next higher skill level.
- 79-60: Verified as competent at present skill level.
- 59-0: Not verified as competent at present skill level.

To predict qualification for the next higher skill level, 25 to 33 percent of each test consists of tasks from that higher skill level. To score 80, one must have gained at least some points from the higher skill level items.

The three ranges have provided insufficient discrimination between soldiers for the personnel management system. At present, raw normative scores are used by the personnel managers. Further, soldiers scoring 60 to 79 are promotable with a waiver. Finally, soldiers failing the SQT are promotable with a waiver if the verified and qualified pools are insufficient for the Army's promotion needs.[8]

SQT Validation

SQT's are validated by the proponent school. The primary objectives of the validation process are to determine that the test items are fair, can be understood by the test population, and discriminate between performers and nonperformers.

Early experimentation with SQT-like, hands-on testing revealed a major problem regarding the consistency with which two evaluators observing the same performance would score that performance. Army Research Institute sponsored experimentation with performance testing of four common Skill Level 1 tasks. They found low interrater reliability within 35 percent of the performance measures for those tasks.[9] Accordingly, current SQT development and validation processes call for the deletion of any hands-on test that manifests less than 80 percent reliability among raters. Further, SQT evaluators receive a standard block of training. During actual SQT administration, equally trained alternate evaluators are positioned at each test station and members of the tested unit chain of command are invited to monitor the conduct of the test.

During validation trials of an SQT, each evaluator and soldier is questioned about the fairness of the test. If less than 80 percent of the evaluators or soldiers agree with the fairness of the test as a whole or with any scored unit, the conditions and/or standards are revised or the item is deleted.

Validation of written component items can be accomplished by one of three procedures. The preferred procedure is to test 30 soldiers in the appropriate MOS skill level. At least 10 of them must first rate themselves as either capable of performing or not capable of performing the task. The results of the actual written test must agree with the earlier self-ratings in that more self-rated performers must pass the written item than fail it. If not, the item must be revised and again tested on a new group of 20 soldiers, at least seven of whom rate themselves as performers.

The second method of validating written component items is to try the item on five soldiers whose self-ratings and their supervisors' ratings agree regarding their ability to perform or not perform the task. At least two of the five soldiers must be performers. Actual written test results must be 80 percent consistent with the ratings.

The third, and least preferred method of validation, is to use five soldiers and three "experts." The soldier self-ratings must indicate that they can perform the task even if "not very well." Then the experts interview the soldiers and rate them as performers or nonperformers. Actual written test results must be at least 80 percent consistent with the ratings.

Results and Perceptions

The first large-scale validation was given to MOS 11B1 infantryman. The hands-on tasks were:

a. Emplace, aim, arm, and simulate firing a Claymore Mine within 2 minutes.

b. Detonate one of three hand grenades within 5 meters of a silhouette target within 30 seconds.

c. Extend, arm, and simulate firing an expended M72A2 LAW within 30 seconds.

d. Load and fire an M60 machinegun within 20 seconds; unload and clear within 20 additional seconds.

e. Don and clear a protective mask within 9 seconds.

f. Assemble and set frequency on the AN/PRC-77 radio within 2 minutes.[10]

The results were not encouraging. In the 11B1 SQT validation, no soldier scored 80 percent or higher--the cutoff for qualification for promotion to the next higher skill level. Only 10 percent scored 60 or above--the minimum for verification of competence at their present skill level. These dismal results led to a flurry of analyses. Although the task selection

process had been somewhat arbitrary (based primarily on psychomotor tasks and modest resource involvement), the tasks selected seemed reasonable. The poor performance was attributed to the fact that there was no incentive for performing on this shakedown trial. The lesson to be learned was that without incentives soldiers will not take testing seriously.[11] There is no evidence that soldiers deliberately failed any tests. They simply did not prepare themselves. The results reflected their true "steady-state" capability. In spite of the poor scoring on the test, 95 percent of the soldiers said the test was fair and valid.[12]

Record testing of MOS 11B and 11C (Infantry, Mortar) has shown improvement over the results of the SQT validation. The results for both MOS at various skill levels are shown below:

	SQT 2 (E1-4)		SQT 3 (E-5)		SQT 4 (E-6)	
	11B	11C	11B	11C	11B	11C
QUALIFYING	23%	6%	28%	11%	27%	24%
VERIFYING	47%	31%	49%	40%	49%	45%
FAILING	30%	63%	23%	29%	24%	31%

Figure 3-2. Skill Level Test Results

The 11C soldiers scored lower than 11B soldiers, with the largest difference at Skill Level 1 (SQT 2). Within SQT 2 there were 15 scored units common to both tests. While the 11Bs performed slightly better, the pass rates were equal and the normative differences were modest. The discrepancy was primarily due to performance on MOS-unique tasks. In the written component of each test, there were three possible reasons for the difference: that some of the 11B population had participated in the SQT shakedown, and although new tasks were involved, they were taking the SQT for the second time; that the written component of the 11C test was more difficult than the written component of 11B tests; or that 11C soldiers are less well trained than 11B soldiers. Previous participation in the SQT validation could not be supported as a reason for the discrepancy. The 11C test was found to be somewhat more difficult in terms of readability, having 15 percent more words in situational descriptions. Five percent of the units scored on the 11B written test involved mathematical computation and/or chart reading, in comparison with 45 percent of the units scored on 11C written test. There was no reason to challenge the appropriateness of these scored units in relation to the job.[13] Ruling out the first hypothesis, and finding the second to be upheld but justifiably so, led to the following observations:

> "Skill qualification testing is based upon a rationale which mandates training relevance. This is the essence of

the system, and the requirement for training relevance underlies the emphasis on thorough job and task analysis, task criticality, performance-oriented testing, SQT validation, and criterion-referenced rather than norm-referenced standards. The logic of the SQT system says that in the absence of competing interpretations which may be strongly plausible in a specific case, poor SQT performance is to be taken as indicative of a need for training. There is no reason to question the correctness of such an interpretation in regard to performance on SQT 11C2. As a case in point, it may be pertinent to note that one task in the 11C (test) was "Call for/adjust a coordinated high explosive and illumination mission (Task 071-11C-1503). The SU included three questions, all of which the soldier had to answer correctly in order to score "GO." Ninety-six percent of the soldiers failed this task, and most of them answered incorrectly a question about the command to be given after illumination rounds had been adjusted to land on target. At the molecular level, this presumedly reflects a widespread lack of training ... If SQT 11C2 is a more difficult test than SQT 11B2, it is then pertinent to ask whether this difference is spurious or is reflective of actual differences between MOS 11B and 11C. It may be that the tasks which 11C soldiers are required to perform are conceptually more difficult than the tasks required of 11B soldiers. None of the data available here speak directly to point."[14]

Reports

SQT results are provided the individual soldier, with summary data compiled for company and battalion level. Part I of higher level reports shows how well subordinate units did in relation to the training standard, and it can serve as a guide when planning training or allocating overall training resources. Part II shows the results by task number. By summarizing SQT results for all subordinate units, these reports identify training deficiencies across the MOS population. SQT reports can help commanders and training managers close the gap between the design capability of a weapon or other system and the actual performance of that system in the hands of individual soldiers. This is done by providing specific information on individual training deficiencies. It can be an important first step in improving individual job skills and collective performance through an improved training management system.

Individual SQT results are also used by the US Army Military Personnel Center (MILPERCEN), where they are instrumental in making individual personnel management decisions. As an example, SQT scores are used to determine eligibility for promotion.

Resources

Concern that preparation for and administration of the SQT consumes an exorbitant amount of time, resources, and management led HQ FORSCOM to investigate the impact of individual training requirements on unit training programs. Since only Career Management Field 11 has been tested, the full impact is not known. Several points have emerged, however. Operations sections have not yet become overextended, but with SQT expansion, the administrative burden may become excessive. The volume of tasks, skills, and related material in the unit is currently at a manageable level. Commanders now have sufficient resources to develop proficiency in both soldier's manual and ARTEP tasks. This is only accomplished, however, by peaking for the SQT, and concentrating on individual training while collective training suffers.[15] It appears, then, that the SQT system creates a strain on either training time or management expertise which makes it very difficult to maintain proficiency at an acceptable level. This situation argues for more time and better management. It also argues for reduction of the required soldier tasks to an absolute minimum number of skills which are essential to success in combat and which are compatible with a total training system wherein all critical individual and collective skills can be continually maintained at an acceptable level.

Present Status

While the embryonic SQT program is not without flaws, it represents a major step forward in many respects. Jobs are being defined in terms of critical tasks. The tasks are published in the soldier's manual and a copy is given to each soldier. A job book, for recording individual mastery of soldier's manual tasks, is given to the first line supervisor. The commander's manual tells the commander which tasks the members of his command are responsible for, and indicates which tasks have been initially taught in the training base and which tasks he is responsible to train in the unit. This broad dissemination of training objectives, in and of itself, can be expected to have a positive effect.[16]

Although job competence, as indicated by SQT scores, is not directly tied to promotion at this time, there can be no doubt that the higher the SQT score, the greater one's chances are for promotion. Further, the program provides a structure such that when a data base of SQT performance is available, the "qualified" and "verified" thresholds may become specific and binding promotion criteria. There is concern that the present policy of accommodating the needs of personnel managers with normative percentile SQT scores will undermine the whole movement toward performance standards. The principle reason for insistence on percentile ranking is that the number of soldiers who pass the test may be less than promotion quotas. Since the number of soldiers who pass the test will never match precisely the promotion quota, percentile rankings may become a permanent, rather than an interim, departure from the criterion-referenced standard. Percentile rating is misleading to both the soldier and his commander. A soldier may be

led to believe he is qualified for promotion even though he has not demonstrated the minimum acceptable performance for the job.[17]

SQT and Unit Evaluation

Presently, the intent of the SQT feedback system is to identify training needs. Using test results to compare commanders or units is thought by some to be counterproductive to the purposes of the SQT program. This point is debatable. As long as there are means to maintain the objectivity and consistency of the testing system, fears of bias or inflation should be minimal. As it is now, the system provides the soldier with a strong incentive to perform well because it is a factor in personnel management decisions. Disassociating the SQT results from the unit's reputation deemphasizes the commander's responsibility to maintain that portion of his unit's combat effectiveness which results from the individual skills of its members. The Army's goal should be to focus competition to achieve excellence on those things which are truly important.

CHAPTER IV

COLLECTIVE TRAINING PROFICIENCY

General

Although individual skills are essential to group performance, successful team performance requires more than a simple aggregation of independently proficient individuals. The team's effectiveness depends on the integration of individual performances into a coordinated entity striving toward a common goal.

Teams consist of two or more people associated in some activity. There is a rigid structure and a set communication pattern. Being oriented toward a goal, the team has certain functions to perform as an entity. Performance of team functions is accomplished through the coordinated participation of individuals, each performing well-defined functions.[18]

The best measure of team proficiency is the extent to which the team accomplishes its collective goal. Ideally, this should be determined by observing the results of the team performance. The Field Artillery gunnery team is a good example. The team is successful and has met its performance-oriented standard if the projectiles land on target. This can be termed "results-oriented assessment."

There are cases where results cannot be observed in a training environment. The current lack of a real time casualty assessment system prevents realistic observation of the results of a maneuver battalion's attack. Assessment of successful performance in such cases must be "procedure-oriented." The evaluator must judge whether the manner in which the battalion went about its business would have yielded successful results in a more realistic simulation. Procedure-oriented evaluation must address the performance of individual skills, stylized group activities (standard operating procedures and battle drills), and the integration of all the efforts into overall collective performance. Procedure-oriented evaluation is dependent on the knowledge and judgment of the evaluator. Being vulnerable to errors in judgment and subject to credibility loss due to differences in opinion between evaluator and evaluated, procedure-oriented assessment is acceptable only when a results-orientation is impossible.

The ideal in performance evaluation is results-oriented assessment and procedure-oriented diagnosis. Procedure orientation has its

legitimate place as a diagnostic approach. When results-oriented assessment is possible, it should be coupled with procedure-oriented diagnosis for isolation of the sources of inadequate performance and suggestions for improvement.

Background

Until the early 1970's, Army collective training was designed around a mobilization model. Geographical location, limited global commitments, and the nature of warfare permitted planners to assume time to activate, train, and deploy units. The training vehicle was the Army training program (ATP), which included basic and advanced unit training. The evaluation instrument was a series of Army training tests (ATT) which prescribed progressive testing of successively higher echelons.

The mobilization training model was used by the Active Army in its annual training cycle. This training cycle began at the lowest levels with the appropriate blocks of instruction from the ATP. Completion of an echelon's portion of the ATP signaled the administration of an operational readiness training test (ORTT) which was extracted directly from the appropriate ATT. Completion of the ORTT indicated readiness to progress to the next higher echelon's portion of the ATP, culminating in the battalion ORTT and larger unit maneuvers which were often conducted in late autumn.

The ATP was time-oriented rather than performance-oriented. There was a tacit assumption that completing a specific number of hours of training equated to proficiency. This approach facilitated management of the "time" resource but distracted attention from the fundamental goal of collective training--combat effectiveness through team proficiency.

In the early 1970's, it became apparent that the underlying assumptions of the mobilization training model were no longer valid. Changed global commitments and the probability of short, intense, limited-objective conflicts which could be lost in a matter of days necessitated the ability to fight a "come as you are" war. This requirement was incompatible with the cyclical proficiency patterns which were inherent in the annual training cycle. Concern about this led to development of the ARTEP.

ARTEP

Just as the soldier's manual defines the training objectives for the individual, the ARTEP establishes the performance-oriented training objectives for collective training. It is intended to serve as a compendium of combat-critical missions which are essential to a unit's survival and success in combat. These missions are appropriate tasks, conditions, and standards for the unit (normally battalion) and all subordinate echelons.

The ARTEP standards are performance-oriented. Where possible, normally at the lower echelons, they are also results-oriented. Many missions are not amenable to results-oriented assessment, however, because of the limitations of today's training technology and the Army's understanding of the parameters of combat effectiveness.

The rifle squad forced march/live fire exercise is an example of a mission with results-oriented standards. In phase 1 of the exercise, the squad conducts a dismounted, 12-kilometer march along a designated route. All squad members must complete the march within 2 hours with all specified weapons, ammunition, and equipment. During phase 2, the squad occupies a hasty defensive position and engages an attacking opposing force. There are precise standards which govern the number of targets which must be hit.[19] Although the standards for the forced march/live fire may be arbitrary, they are objective and results-oriented. It is possible to state without argument whether the squad satisfactorily completed the march and hit the appropriate number of targets.

The standards for the battalion task force movement to contact are less objective. To receive a satisfactory rating the task force must demonstrate proper use of movement techniques, terrain, and fire support to maximize its combat power and minimize its vulnerability to the opposing force. Further, it must determine the opposing force's disposition and develop the situation without sustaining excessive casualties and equipment loss.[20]

This is the best the Army can do at the present time. The battalion mission does state performance criteria. Many of the criteria, however, are subjective in nature and are procedure-oriented rather than results-oriented. The proper use of movement techniques and terrain are related to how a unit goes about its mission, not whether the mission was accomplished. This is necessary because there is no way to measure mission accomplishment objectively. Even those standards which are results-oriented are subjective. The evaluator must use his judgment to determine whether the mission would have been accomplished in actual combat, how many casualties would have been suffered, and how much equipment would have been lost. Beyond that, the evaluator must decide whether those casualties and losses were excessive. Training technology will not yet permit more objective evaluation, but major changes are on the horizon.

ARTEP Validation

While there are specific testing procedures governing SQT validation, ARTEP validation is normally a staffing process. The proponent school prepares a coordinating draft which is forwarded to the major operating commands and other concerned schools and agencies. Proponents are encouraged to send copies to selected units and staff agencies for review and comment.

If the proponent school, any major command, or TRADOC Headquarters desires, a formal validation is conducted. This approach involves publication of a test edition which is distributed to selected units for execution. The feedback from test units is circulated to the major commands and changes are negotiated. This completes the validation process. The ARTEP is printed in final form and immediately supersedes the previous ARTEP or the corresponding ATP/ATT for the unit concerned.

ARTEP and Readiness Reporting

There is a whole mythology surrounding the introduction of the ARTEP and the reasons why ARTEP results are not included in readiness reporting.

> "Prior to 1971, the training readiness indicators were enmeshed with tests, inspections and exercise results, in an attempt to bring some degree of objectivity to the conclusions reached."[21]

Prior to the introduction of performance-oriented training, however, increasingly more complicated reports could not bring objectivity to what was, at its core, a subjective view of proficiency. The resource constraints, personnel turbulence, and decreasing experience level of the Vietnam era made the maintenance of training proficiency virtually impossible. The readiness reporting system of that time based training readiness firmly on successful completion of ATTs. Although true unit training was impossible, the reporting system was inflexible. ATTs became less valid and more subjective. "Constructive credit" was granted for participation in firepower demonstrations and other, similar exercises.

As the thread of credibility in training readiness ratings stretched and finally broke, belief and acceptance in the subjective and procedure-oriented ATT were lost as well. Although the ARTEP is performance-oriented in philosophy and more objective than the ATT, much of it remains subjective. An Army which had seen the training and diagnostic values of the ATT and a portion of its own integrity disappear in an era of decreasing resources and overbearing demands, opted to separate ARTEP evaluation results from the unit readiness reporting system. The intent was to maintain the training value of ARTEP, making it permissible to admit shortcomings and, therefore, preserving its diagnostic features.

Concept vs Reality

Regardless of the original intent, much of the Army views ARTEP as a test. The reasons are understandable. The word "evaluation" in the title is closely associated with "test." ARTEP summarily superseded the Army training test as well as the Army training program. Finally, if any commander perceives ARTEP as a test and uses it as such, to his subordinates it is, in fact, a test.

The Field Artillery School conducted a survey to analyze the way Field Artillery units use ARTEP to evaluate, plan, and conduct training. The survey was addressed to 58 Active Army units, focusing on training managers at battalion, battery, and section level. Responses indicated that ARTEP is used extensively, that it is effective as a diagnostic and management tool, and that training managers generally consider it to be clearly written. Seventy-five percent of the battery training managers felt that ARTEP is perceived as a test by the higher headquarters. Ninety-two percent of the battalion managers reported APTFP is used as a formal evaluation on a yearly basis. Perception of the purpose of the evaluation seems to relate directly to whether an individual is an evaluator or is being evaluated. The periodic ARTEP evaluations are considered to be informal evaluations by the battalion training managers, but are perceived by the battery training managers to be formal evaluations. Significantly, 96 percent of battalion training managers and 88 percent of battery training managers regarded the ARTEP as effective in measuring the training aspects of combat readiness.[22] There is also an emerging perception that conflicting demands and limited resources restrict the training capability of the Army. Unless these restrictions are changed, the Army, manned and managed by average men, cannot maintain consistent performance of all ARTEP missions at the standards required on future battlefields. To do better, the Army must do less, focusing its effort on fewer things and learning to do them exceedingly well.

Future Developments

In the past, the best means to evaluate the training effectiveness of combat units was the tactical field training exercise.

> "Before 1974, traditional tactical field exercises had taken two forms:
>
> 1. The firing of live ammunition at immobile targets which could neither fire back, nor hide or protect themselves.
>
> 2. Blank firing exercises between opposing forces where the effectiveness of the fire was left to the subjective judgment of the umpires.
>
> Both exercises have as their chief shortcoming for tactical training (and evaluation) their inability to realistically simulate the battlefield. Live fire exercises bear only a slight resemblance to combat; immobile targets simply do not represent a skilled and determined enemy. The effectiveness of live fire exercises may also be overestimated because the simple realism of battle sounds may suggest that other combat aspects are being realistically simulated as well.

> Inherent safety constraints also restrict freedom of action and thus the believability of these exercises. Blank fire training, unlike live fire, has the decided advantage of permitting two opposing forces to attack each other. While the blank rounds realistically simulate the act of firing, they provide no objective feedback to the participant (or evaluator) on the effectiveness of his fire. Casualties are based on the subjective judgment of personnel umpiring the exercise. Both types of training provide little or no opportunity for participants to acquire tactical experience that can be transferred to combat."[23]

Blank firing exercises create erroneous impressions of the nature of modern warfare. Engagements are resolved at unrealistically short ranges. Mobility can be fully exercised in blank firing exercises but firepower cannot. The result is a very unbalanced perception of the modern battlefield. These and other differences between training exercises and actual combat make evaluation a virtually impossible task. It is small wonder that combat effectiveness evaluations based on performance in field training exercises lost credibility and fell into disuse.

The ATT was based primarily on the blank firing exercise or field training exercise. The ARTEP is an improvement, but it is still the captive of unrealistic training technology. Neither the commander nor his superior can obtain objective and accurate combat results. Since results are not observable, the natural tendency is to observe and evaluate procedures. Preparation of an elaborate operations order can become more important than focusing all available combat power to accomplish the mission because the order can actually be written and the product observed, whereas the actual operation cannot be realistically performed.

Experiments with REALTRAIN, an early form of tactical engagement simulation, have demonstrated the realism and objectivity which is possible. Introduction of the Multiple Integrated Laser Engagement System (MILES) will remove much of the subjectivity regarding what actually happened by providing a real time casualty assessment system and, thus, permitting results-oriented assessment all the way up to maneuver battalion level.

Development of the National Training Center (NTC) will be an even greater step forward. The value of the position location and recording capability envisioned for the NTC has already been demonstrated. CDEC's Real Time Casualty Assessment System and the Air Force capability at Nellis AFB (Red Flag) permit an evaluator to observe and study realistic combat results and the movements and actions of all the elements participating in an exercise. This permits both credible results-oriented assessment and procedure-oriented diagnosis. When installed at the NTC, such a system will give the Army a threefold benefit.

As a research tool, it will allow determination of the truly critical skills and the associated proficiency levels required for success in combat against a realistic and professional opposing force. As a unit evaluation system, NTC instrumentation will permit unit commanders to compare results with procedures to diagnose and correct weaknesses as well as capitalize on emergent strengths. As a source of summary data, unit performance at the NTC can be aggregated into a continuously updated index of the Army's proficiency to assist its leadership in force development and resource management decisions.

CHAPTER V

CURRENT EVALUATION TECHNIQUES

This chapter addresses current measurement and evaluation techniques. The emphasis is on the Army's readiness reporting system because it is the primary measure of readiness in use today. Other systems are mentioned briefly.

Army Readiness Reporting

Army Regulation 220-1 governs the system which attempts a comprehensive summary of the readiness state of the Army. The system is useful to the commander and the resource manager who must maintain units in a condition to deploy to a combat theater. There are two major points worthy of note. First, this is a status report, not an effectiveness or readiness report. Second, unit readiness reporting (URR) suffers from a distinct credibility problem.

Readiness reporting addresses whether a unit has its appropriate complement of personnel and equipment, the personnel qualified for their assigned positions, and the equipment in condition to deploy. It further contains an estimate of the amount of time required to bring the unit to a "fully trained" status. Essentially, this is a statement of the extent to which the unit is "filled" with resources and of the time needed to reach a vaguely stated condition of training proficiency. The report is a statement of readiness to deploy. It is not a good estimate of how well the unit could perform its combat mission and, therefore, is not a measure of combat effectiveness.

Unit readiness reporting's credibility problems are documented in a study conducted by the Strategic Studies Institute of the Army War College. The following extract summarizes these problems.

> "The System and Its Reputation.
>
> 1. Self-Reporting Systems. Self-reports are more susceptible to bias and distortion than any other type of reporting according to measurement theory. Outside evaluations are preferred. In order to accomplish the purposes of readiness reporting, however, regular, relatively frequent input of data is required from the unit level. To meet that requirement through an outside

evaluation system would be prohibitively expensive in resources. Therefore, a self-report by the unit commander is the next best means to evaluate the unit for readiness reporting purposes. Recognizing the shortcomings of any self-reporting system, the system established by AR 220-1 should be carefully constructed to minimize the natural tendencies toward bias and distortion.

2. Perceptions of Readiness. The study team found the entire subject of unit readiness and unit readiness reporting to be one of intense interest throughout the Army. With very few exceptions, Army personnel recognize and accept a need for unit readiness reporting of some type. Many differing opinions about the present system and its functioning were expressed to the team. The one common concern which dominated throughout, however, was that the reporting system should function with integrity and produce valid and reliable results. Overall, the feeling is that this is not the case at present. The system is in disrepute throughout the Army with the disfavor intensifying as one goes down the various chains of command. (It is more intense in some chains of command than others.) Finally, at the bottom, NCO's are the most vociferous in condemning the manner in which the system is functioning.

3. REDCONs, ALOs, and Pressure. As far as the reporting system itself is concerned, dissatisfaction is centered in two areas. First, is the calculation of REDCON or "C" ratings, the mechanics of which tend to permit inflation and to mask problem areas. Second, is actual or perceived pressure, within the system, to meet or exceed the authorized level of organization (ALO) assigned to the organization by the Department of the Army with a matching "C" rating. Coupled with this is the conviction of many commanders that their performance is being judged by the "C" ratings they report in comparison to other commanders in the organization. This tends to make readines reporting a deadly serious, sink or swim, competitive consideration in the minds of many individuals operating within the system.

4. Manipulation and Frustration. Overall, the results of the study indicate the system is not functioning with the degree of validity and reliability expected. Additionally, many of those surveyed reported experiences which, in their view, involved lack of integrity and/or proper professional ethics within the functioning

of the system. A number of commanders at the battalion and company levels stated that, in the leadership climate within which they were functioning, combined with their perception of what it takes to continue successful Army careers, they felt they had to take full advantage of the considerable judgmental and managerial flexibility permitted by the regulation to report as high a rating as could possibly be calculated under the system. Although such reports meet the letter of AR 220-1 and are not false reports in that sense, these commanders believe the reports do not meet the intended spirit of the regulation and present a distorted picture of a unit's actual state of combat readiness. This state of affairs leaves many of these commanders with an intense feeling of frustration and a very cynical view of Army readiness reporting--a view where they see themselves as unable to realize the high degree of professional and ethical conduct to which they aspire. However, they do not damn themselves as dishonest inasmuch as their reports remain technically within the rules of the system. With this existing situation, the plea to the study team was to remove the loopholes and the opportunities for favorable manipulation of the factors used in C-rating calculations which can result in distortion toward higher ratings generated by command and competitive pressure. It is recognized that removing the loopholes would <u>result in lower reported readiness ratings under present rating criteria</u>. This would necessitate appropriate explanations to report users and perhaps some criteria adjustments."[24]

The pressure to inflate readiness status, although natural in the context of the Army's traditional "can do" attitude and competitive climate, is a perfect example of a self-inflicted wound by the Army. The URR is intended to reflect the actual condition of the force and to report problem areas. When problem areas are minimized and objectivity prevented, the Army is unable to reflect its actual readiness and to demonstrate its need for resources. If extended resource cuts produce no equivalent reductions in readiness, particularly training readiness, civilian managers can only assume that they have rightfully pruned away fat. Without a disciplined readiness reporting system, the Army cannot communicate its true condition.

The URR has three major reportable areas: personnel, equipment, and training. The personnel and equipment sections have their problems and suffer from certain abuses. Although they are important, these problems are of peripheral interest to this concept paper. They have been addressed fully by the Strategic Studies Institute's study, and some changes are underway.

The training section of the URR is of very little value. It is wholly subjective, based on unrealistic assumptions and suffers from even greater internal and external credibility problems than the rest of the report. The Strategic Studies Institute reported the following:

"Training Readiness.

(1) Invalidity. It readily became apparent as interviews with URR personnel progressed that there was very strong feeling that the training portion of the URR was too subjective to be anything more than a wishful-thinking guess. The training REDCONs being reported are therefore regarded as both inflated and invalid by a sizeable majority of those interviewed, particularly at company level.

(2) Assumptions. Especially singled out for criticism was the requirement to make an estimate of the number of weeks of training necessary to achieve a fully trained status using assumptions in which there is little faith. In actuality, the training REDCON seems to be an almost automatic function of the personnel and resource area REDCONs. The natural tendency is to use the 'can do' rule and rate it at least equal to these other areas. It was frequently stated that a commander under pressure is prone to use the assumptions to rationalize himself up to a C-1 in training REDCON when the unit was really at a much lower status.

(3) Standards. The AR gives a commander quite general standards and instructions to use in determining the training REDCON of his unit. He is asked to consider, in his evaluation of training readiness status, 'ALO, equipment and facilities for training, personnel available for training, MOS qualification, maintenance proficiency, personnel turnover rate, retained exercise proficiency, and elapsed time since last service practice.' These general yardsticks are considered by most battalion and company level commanders interviewed to be far too open-ended. They indicated a preference for a more detailed, more objective training readiness measurement system which in their words would elevate the determination of training REDCON from a 'gut feel,' 'can do,' 'arbitrary,' or 'wild guess,' exercise. The study team is very favorably impressed with FORSCOM's efforts to develop an objective training readiness evaluation system. That system offers promise of being responsive to the problem raised here and it also will be responsive to criticisms that the missions contained

in TOEs are too general to use as objectives against which to measure training states.

(4) <u>Subjectivity</u>. A minority group, fearing centralization, favors the retention of the broad, subjective system the Army has now for URR training REDCON purposes. This group is mostly concentrated above battalion level. What the study group heard most often, however, were calls for quantifiable criteria, milestones, benchmarks, yardsticks, and guidelines conforming to specific mission statements. The suggestions offered most often to help solve this problem were centered on the ARTEP and/or recently completed mission-related exercises which could in some way be translated into C-ratings. This concept is incorporated in the previously mentioned FORSCOM test. Without such objectivity, there was some sentiment in favor of dropping training as an area of consideration in the URRs.

(5) It is extremely doubtful that under present-day conditions an average Army unit can reach a fully trained C-1 category. One general officer stated his belief that no rating higher than C-2 is possible unless a unit can devote full time to mission training. Training, even field exercises, are poorly attended. DA IG statistics indicate an average 50-55 percent present for training figure throughout the Army. Some interviewees set the figure even lower. Units reporting C-1 should be subjected to extend [SIC] evaluation to substantiate the rating.

(6) Considerable concern was expressed over the lack of qualification of AIT graduates, the unjustified award of MOS's, and the quality and effectiveness of OJT. The nonavailability of training areas, funds, POL, modern equipment, and other resources all take their toll of the training process. Lack of realistic training to include night training and short-term unit integrity are considered to be more severe than readiness reports indicate. The cumulative effect of these factors militates against attainment of a high state of training readiness.

(7) The general consensus, then, is that current training REDCONs are unreal, inflated, and biased."[25]

The Army once had, and to some extent still has, the attitude that, while a unit could legitimately be below par in terms of personnel or

logistics, every commander must maintain training proficiency, regardless of resource shortages. Although the attitude had some usefulness in eliciting a maximum effort, it makes lack of a tie between resources for training and training proficiency an especially serious problem. Since there is no accepted means to establish the minimum training resources (in people, dollars, and time) required to achieve and maintain acceptable proficiency levels, the Army is at the mercy of its own ethic. Recent changes to AR 220-1 provide an opportunity to report training resource problems areas.[26] This implies that it may be expected that some units will be less than perfect in terms of training. A further proposed change will, if implemented, link resource levels to levels of training effort on a 12 or 14 point scale. This change recognizes the fundamental importance of the connection between resouces and readiness and should permit better communiation between training and budget staffs.

FORSCOM's Supplementary Unit Readiness Program

In late 1975, FORSCOM undertook a study to develop an in-house supplementary report to AR 220-1 which governs unit readiness reporting.[27] The supplementary program was tested in several FORSCOM units and resulted in FORSCOM Circular 350-8, FORSCOM Training Readiness Program. The circular was published as a guide which commanders could use in determining their training REDCON.[28]

The circular presents specific criteria in the form of training requirements and frequency. For example, tank platoons of Armor battalions are expected to conduct movement to contact and hasty attack in accordance with ARTEP training and evaluation standards, at 80 percent operating strength, and not less than semiannually.[29]

The criteria expressed in FORSCOM Circular 350-8 are not, nor are they intended to be, tied directly to C-ratings. The intent is to prescribe a training program and evaluation schedule that would provide an abundance of performance data to commanders as they consider the weeks required to achieve a fully combat ready status. This is the pivotal question in the AR 220-1 URR system.

Army Operational Readiness Inspections

The Army operational readiness inspections (ORI) are conducted to determine the ability of Air Defense units to perform their operational mission.[30] Evaluations can be conducted from any state of alert (5 minutes, 20 minutes, 1 hour, 3 hours), but generally the evaluation requires the fire unit first to be brought to a 5 or 20 minute status and then to perform a series of tasks as the evaluation team determines the actual readiness of the firing unit. Normally, there are prefiring, firing, and postfiring tasks.

The ORI is equally applicable to Nike Hercules or IHawk. Operational evaluations are also conducted of Chaparral and Vulcan units, both of which

have an equipment evaluation and a loading exercise. The equipment evaluation varies widely throughout the Army--in some units it takes on the flavor of a mini-CMMI inspection.

SHAPE Tactical Evaluation

Over the last few years the ORI in both Nike Hercules and IHawk has been overshadowed in European deployed units by the SHAPE tactical evaluation. The ORI is an integral part of the tactical evaluation but the latter additionally gets into virtually every other area of battery and battalion operations.

SHAPE tactical evaluations, known as TAC-EVAL, are inspections administered to selected NATO Army and Air Force units on a no-notice basis.[31] A TAC-EVAL takes 3-4 days and addresses four areas: alert posture and reaction, mission effectiveness, support functions, and ability to survive.

The alert posture and reaction portion tests a unit's capability to move from a peacetime to a wartime posture within the time prescribed by NATO/national directives.

The mission effectiveness portion assesses a unit's capability to sustain operations after a transition to a wartime posture. Emphasis is on successful performance of assigned missions through effective management of unit resources.

Support functions are examined to ensure that the unit mission can be initiated on time and sustained. The evaluation focuses on demonstrated capability and assesses maintenance management aspects.

The final section evaluates the unit's ability to survive and continue actions under any conditions of enemy attack.

Training Evaluation Visits

HQ FORSCOM conducts short notice, informal training evaluation visits (TEV) to all FORSCOM installations and FORSCOM units on other MACOM posts at least annually.[32] The primary purpose of these visits is to observe and evaluate the management and conduct of unit training. Secondary purposes are to exchange information and assist in problem resolution.

After each TEV, a complete report is submitted to the FORSCOM Chief of Staff. Copies of the reports are not released outside HQ FORSCOM until after submission to and approval by the DCSOPS and Chief of Staff. Required follow-up actions are the responsibility of the staff activity concerned for the unit.

Emergency Deployment Readiness Exercise

The emergency deployment readiness exercise (EDRE) is a test of a unit's capability to deploy under emergency conditions and an installation's capability to support the deployment.[33] Both unit and installation must plan for and conduct training to support deployment under limited time constraints.

Reserve Evaluation System

The Army uses the Reserve evaluation system (RES) to evaluate Reserve Component training readiness as a management tool.[34] The primary feature of RES is the evaluation of each reserve unit's active duty training. Active Army evaluators grade each unit in approximately 40 functions based on guidelines established by FORSCOM. The RES also includes information regarding facilities and equipment available during weekend drills, personnel status, weekend training, and weapons training.

Marine Corps Combat Readiness Evaluation System

The Marine Corps combat readiness evaluation system (MCCRES) is a comprehensive system which the Marine Corps is in the process of developing and implementing.[35] Similar to ARTEP, the MCCRES provides a system of structuring evaluation checklists into tasks, conditions, and standards. Task priorities will be established, and tasks will be classified into categories such as universal and mission specific.

Air Force Operational Readiness Inspection

The Inspector General of the Air Force conducts periodic, no-notice inspections to evaluate a primary combat force unit's performance and capability to accomplish its primary or assigned mission. During the course of the Air Force operational readiness inspection (ORI), the unit is tested in its various mission areas under as realistic conditions as are possible.[36]

Air Force Unit Capability Measurement System

The Air Force unit capability measurement system (UCMS) gathers data on five measures, applies the data to specific mission capability, and expresses readiness in terms of the number of sorties a unit can generate.[37] The five measurement areas are personnel, individual skills, logistics, equipment, and crews.

Air Force Graduated Combat Capability

The Air Force graduated combat capability (GCC) is a new system which depicts the relationship between assigned unit combat missions and resources available to support training requirements.[38] A unit's missions are compared with the sorties required to maintain proficiency in

that mission area. The available sorties are constrained by and provide the link to resources. If sorties are not available to train to the desired proficiency level, more resources are provided or a lower level of combat capability is accepted. This system is connected with the Air Force Inspector General's operational readiness inspections which may not evaluate a unit against a higher standard than the one for which resources are provided.

Maintenance Evaluations

While maintenance evaluations are not training evaluations per se, they provide information about combat effectiveness as influenced by logistics. They are indirect measures of training proficiency since the quality of the maintenance operations is a function of the individual and collective proficiency of those who man it.

Supply and Administration Inspections

Annual General Inspections provide information regarding readiness in the areas of administration and supply. As with maintenance evaluations, these are not direct evaluations of training proficiency, but the results are influenced by the training proficiency of the soldiers who operate the systems.

CHAPTER VI

COMBAT EFFECTIVENESS--AN EXPANDED APPROACH

The Requirement

No single formulation can express the actual state of the Army's combat effectiveness, because there are various sets of decision makers. These include unit commanders, resource managers, materiel developers, and training developers. Because they deal with differing functional areas, the groups must examine proficiency and combat effectiveness from different vantage points. As a result, they seek effectiveness stated in different forms, each suitable to their particular perspective.

Commanders need explicit statements of the ability of their commands to fight. Resource managers need to envision combat effectiveness in terms of funds, people, and time. Materiel developers must focus on hardware characteristics but not to the exclusion of other aspects. Combat developers must be concerned with the most effective use of new equipment and doctrine. Training developers need to address the overall effects of new training techniques and the training implications of new equipment or doctrine.

There is an underlying need which is logically unassailable but commonly overlooked. That is, each of the statements of combat effectiveness must be compatible with the others and all must be based on the same fundamental reality: a clear and complete picture of the effectiveness of the Army as it actually exists today in relation to its potential adversaries.

Some aspects of combat effectiveness are quantitatively and qualitatively unknowable in any situation short of actual war. The Army has the capability, however, to be far more objective now than in the past. Combat effectiveness can be expressed in terms of a number of basic components. To be useful, these components must constitute measurable, or at least discernible, characteristics of the Army. When combined, they must describe all relevant aspects of combat effectiveness. The system must quantify those features which it can, while carefully avoiding quantification which would be misleading. Finally, to be of practical value, the components must serve as a translation model. It must be possible to focus the individual components into various formulations needed by different decision-making communities.

A descriptive system of six separate components can satisfy most of these requirements. Combat effectiveness can be expressed as a function of the design characteristics of weapons/equipment (WPN), numbers and qualifications of personnel ($PERS_R$), availability and serviceability of equipment (LOG_R), ability to perform specific basic skills and activities (TNG_R), the professional competence of the organization (TAC_R), and the leadership climate of the unit (P/L_R). Thus,

$$CE = F(WPN,\ PERS_R,\ LOG_R,\ TNG_R,\ TAC_R,\ P/L_R)$$

This formulation expands on the three current ingredients of readiness reporting: personnel, equipment, and training. It includes elements which were not previously included (WPN, P/L_R) and it modifies training to make it both more objective and credible. It separates the measurable from the observable but nonquantifiable. It encourages focused thinking about the actual state of today's Army. It supports translation from one formulation to another, permitting consistent decision-making based on a near approximation of reality.

Three components of the system--WPN, $PERS_R$ and LOG_R--fall outside the realm of combat effectiveness as influenced by training proficiency, even though two of them--WPN and $PERS_R$--are influenced by training proficiency. All three components are relatively straightforward and commonly understood. They are addressed briefly in this section to establish the terms of reference for the complete system.

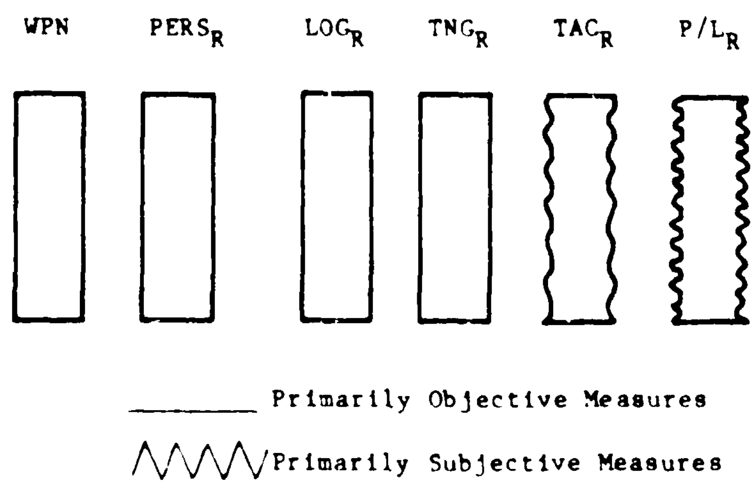

Figure 6-1. Combat Effectiveness

Weapons/Equipment

The first component of combat effectiveness is weapons/equipment. This category includes all items of military equipment which have an impact on combat effectiveness. The shorthand symbol WPN is used to communicate the concept even though the component includes more than just weapons systems. This category expresses the characteristics designed into the hardware as specified in the required operational capability (ROC) which governed its development. It includes physical and performance characteristics which are aggregated in enough detail to satisfy the needs of the particular user. Examples of such characteristics are probability of hit/kill over range, cross-country mobility, survivability, and RAM (reliability, availability, maintainability).

This component normally figures very heavily in computer simulations. It is the most easily obtained, least controversial aspect of combat effectiveness. It is amenable to quantification in a format suitable for simulation. This category has been integrated extremely well into computer simulations. These simulations have been used by Army-level commanders in making strategic decisions and by resource managers determining equipment trade-offs. Doctrine and materiel developers have used these data while developing new tactics and equipment. The Army has, however, been slow to use the other aspects of combat effectiveness to modify the combat effectiveness implied by the equipment's design characteristics. This has reduced the ability to simulate an Army-wide equipment characteristic as it actually is and, therefore, has biased the inferences drawn from the simulations.

The equipment characteristics which are so prominent in simulations are notable for their absence from the URR system. In that system, there is no differentiation between units based on equipment design parameters; distinction is made only on presence and serviceability. This is a logical fallout of the purpose of the report. When used by strategic planners and resource managers as an indicator of readiness to deploy, the URR has little need for descriptors of hardware design capabilities. Should the readiness reporting system be used as an indicator of the Army's effectiveness in combat, hardware characteristics would become essential.

Personnel Readiness

The second component of combat effectiveness, $PERS_R$, is the direct equivalent of the personnel readiness portion of the URR system, with its focus on operating strength, MOS fill, and personnel turnover.

The Strategic Studies Institute found a high degree of accuracy in the personnel resource reporting area of the URR. There was strong criticism, however, that information vital to an evaluation of a unit's personnel readiness is left out of the system. Such things as omission of MOS skill level and subjective standards for OJT MOS qualification

provide loopholes to increase "paper" readiness.[39] With the revised regulation, personnel fill will differentiate between senior personnel and lower ranking enlisted men. Further changes are needed. An objective measure of MOS qualification is included in the discussion of TNC_R.

The URR and other measures of personnel readiness have traditionally been used by commanders and resource managers to monitor and manage personnel status in units. Training developers have used the MOS test and the SQT to monitor the individual proficiency of the Army. As an example, the recent SQT for a particular MOS revealed consistently low scores throughout the Army. Analysis revealed that those soldiers' performance on common tasks (those shared with other MOSs) was equivalent to that of other soldiers. The proficiency shortcomings lay in certain skills which are peculiar only to that MOS. In this case, SQT results highlighted a training problem. The proponent school is changing the training conducted for that MOS.

Personnel readiness is not consistently used in simulations. With the exception of the weapons effectiveness curves prepared by the Army Materiel Systems Analysis Agency, measures of individual proficiency normally have not been included in the simulations employed by doctrine and materiel developers. There is need for research to determine the extent to which measures of individual proficiency can be applied to certain existing simulations.

Logistic Readiness

The third component, Logistic Readiness (LOG_R), is a measure of the ability to sustain and support the force at its maximum potential level of effectiveness. Although the Strategic Studies Institute criticized portions of the equipment section of the URR, it provides an adequate measure of logistic readiness in terms of equipment. However, changes are underway.

Because detailed analysis of logistics is more appropriate for a different forum, LOG_R is addressed briefly here to illustrate the interplay of the different components of combat effectiveness. The individual skills and collective proficiency of logistics personnel are measures of training proficiency. Because they strongly influence the efficiency of the logistic system, they also influence the combat effectiveness of the force, as expressed by LOG_R.

Measures of LOG_R are used quite effectively by the different functional users. Unit commanders and resource managers use a variety of reporting systems to monitor the status of the Army and to allocate resources to maintain effectiveness. Simulations such as the total logistic readiness system (TLRS) provide information regarding the impact of resource changes on the Army's effectiveness.

Materiel developers build their new equipment systems into the existing logistic system. Reliability, availability, and maintainability criteria discipline materiel development to ensure that new materiel can be supported logistically.

Computer simulations have the ability to assess logistic impacts. While such analysis has most often concentrated on developing the logistical requirements resulting from a combat action, it is possible to use a reverse approach, constraining the effectiveness of the force by the limitations of the Army's current logistical capability. The Total Tank System Study and the Anti-Armor System Study are good examples of what can be done in the logistics area.

Training developers in the logistically-oriented institutions make full use of the available tools to draw inferences about the proficiency of logistical personnel and units. Since logistical effectiveness is synonymous with combat effectiveness for service support units, training developers in these areas orient their attention on improving LOG_R through improved training.

Training Measures

The fourth and fifth components (TNG_R and TAC_R) of combat effectiveness are direct measures of training proficiency. Although they could be combined into one component, the division is necessary because it separates two different kinds of proficiency. Training readiness (TNG_R) represents the objective portion of training. Tactical readiness (TAC_R), on the other hand, is the more subjective side of training proficiency. By maintaining a split between the two, the first can be measured and reported with objectivity, while the second is comprised of characteristics which are not amenable to specific quantification.

Training Readiness

The TNG_R component consists of the basic skills or essential soldier's manual ARTEP tasks. For many of these tasks, performance results can be measured or, at least, observed on an effective, unarguable "Go" or "No Go" basis. In some cases, results cannot be observed in a training environment. This may be because it is impossible to recreate all the realities of combat in a training environment. For example, the simulated effects of indirect fire cannot realistically be included in two-sided tactical field exercises. Prior to the introduction of sophisticated simulators, an aviator could not be placed in an actual or simulated crash situation. Alternatively, some training tasks could be performed but are not because of the expense involved. An example is the destruction of a bridge. Although the results cannot be observed and evaluated, there are set procedures and performance requirements which can give predicted results. A leader can go through the procedures of initiating a call for artillery or mortar fire. An instructor pilot can describe an emergency situation and observe the proper execution of the appropriate procedure.

Engineer units can emplace simulated demolitions and the success or failure of the bridge's destruction can be predicted.

The elements of TNG_R are the basic tasks which an individual or unit must be able to execute to accomplish its assigned missions. Examples are: an individual soldier donning his protective mask, a tank crew conducting a battle run, or a maintenance unit performing an engine overhaul. Where results cannot be observed for reasons such as lack of a real-time casualty assessment system, the evaluator has the ability to observe the procedures used and predict combat results. There may be alternative ways to perform these tasks but the different ways are generally known and accepted. There is little "art" involved in performing the tasks included in TNG_R. They are essentially procedural in nature. No large amount of innovation is required. These are the essential tasks which the Army needs its soldiers to be able to do and do well, day in and day out, under high stress. To ensure competence in the essentials, these tasks should be grouped into logical training packages or battle drills.

For individual soldiers, the requirements of TNG_R are embodied in the soldier's manuals and evaluated in the SQT. Although the SQT system has its faults, most of which seem to be growing pains, it can be used now to help the Army understand and communicate its level of individual proficiency. Instead of the subjective and commonly discredited system presently in use for the URR, the SQT gives the Army an opportunity to express its individual MOS qualification in terms which are objective and credible. SQT results are currently summarized at battalion level. These summary results provide a combat-referenced evaluation of the individual qualifications of the unit's members. The percentage of individuals who "verify" their MOS by scoring 60 or higher would make up the MOS-qualified portion of the unit's report. Personnel who "qualify" by scoring 80 or higher could be counted against grade requirements one skill level higher than the one appropriate to their rank. This would greatly reduce the primary problems of subjectivity and accuracy which the Strategic Studies Institute found in the personnel section of the URR.

There are objections to this proposal. The first objection is that SQT testing is not done frequently enough to maintain an accurate picture of the unit's status. The question, How often is enough? requires a subjective and judgmental answer. The Army must weigh the present system, which is current but inaccurate, subject to inflation and not believable, against an alternative which summarizes a measure of individual proficiency which will not be as current but which will be objective and accepted. The proposed alternative has an additional advantage. It can be directly connected with specific remedial training programs and, therefore, indirectly connected to training resources. This would facilitate determination of the resource implications of desired changes in a unit's readiness posture. As the SQT system becomes established, the periodic testing requirements will keep the results current enough to have a usable index of proficiency levels.

A second objection is that linking the SQT to the URR will cause pressures which will reduce the validity of the SQT system. The present SQT system has been designed with safeguards to keep it objective and accurate. These safeguards should prove to be as adequate for readiness reporting as they are for personnel management. If they are not, the safeguards can be increased by no-notice inspections of SQT testing.

Another objection is that such a system will reduce reported readiness. If it does, it will be for the right reasons. With SQT, the Army has an objective measure of individual proficiency. For the first time, it is possible to present to commanders and resource managers at all levels the actual state of individual proficiency in the Army. By presenting such an objective measure, the Army can communicate its individual training proficiency and make a believable case for resource requirements or reduced commitments.

The ARTEP is to collective or team skills what the soldier's manual is to individual skills. The ARTEP provides training and evaluation outlines (T&EOs) which prescribe the minimum acceptable performance levels for a unit and its subordinate units and crews. These T&EOs are expressed in the form of collective training objectives which specify the tasks to be performed, the conditions under which the performance will occur, and the standards of acceptable performance.[40]

ARTEP results as measures of combat effectiveness are not as readily usable as SQT results. As discussed previously, current policy is that results of ARTEP evaluations are not reported to higher headquarters. This policy prevents Department of the Army level decision makers from developing an objective summary of the status of the Army's collective combat effectiveness. The anticipated benefit from this policy may be illusory. There is a strong feeling in many units that ARTEP evaluations are indeed tests and that a unit's performance during these evaluations are factors in the preparation of efficiency reports. As previously cited, a survey conducted by the Field Artillery School found that 75 percent of the battery level training managers who responded felt that ARTEP is perceived as a test by their higher headquarters. Ninety-two percent of the battalion training managers reported that ARTEP is used as a formal evaluation on a yearly basis.[41] To the extent that perception governs actions, the ARTEP is already a test. The result is that the Army's command structure has neither gained the needed information nor succeeded in establishlishing ARTEP solely as a training vehicle.

Policy decisions aside, the ARTEP is not a completely objective evaluation vehicle. The missions in the ARTEP extend to areas where the training environment cannot enable a unit to demonstrate mission performance. For some missions, even the requisite processes are not sufficiently proceduralized to permit unqualified assessment. Such areas are included under TAC_P and will be addressed in a later section.

Many ARTEP tasks do fit the requirements of being objectively observable or governed by accepted procedure. One example of this is the rifle squad's mission to conduct a reconnaissance patrol. Another is the provision of indirect fire support by a firing battery or mortar platoon. The ability of the Supply and Service company of the Supply and Transport battalion to distribute Class III supplies can be determined either during actual conduct of a division field training exercise or with an independent exercise in which the Class III section demonstrates its procedures.

Tactical Readiness

Tactical readiness is a measure of the ability of a commander and his staff to integrate the components of a complex battle system to meet the changing demands of the battlefield environment and accomplish the mission. The responsibility rests with the commander. He and his staff are the control mechanism which establishes the unit's level of TAC_R. TAC_R itself, however, describes the performance of the unit as a whole in terms of its ability to accomplish its goal (combat effectiveness) in the context of a dynamic, hostile, and difficult environment.

TAC_R is the concept explored by the Human Resources Research Organization (HumRRO) under Work Unit Forge I. Forge I referred to TAC_R as organizational competence, the ability of organizations to perform the critical operational processes that lead to the achievement of effectiveness. The focus is on the processes with which the unit goes about its business in terms of three components: reality testing, adaptability, and integration.[42]

For measurement purposes, HumRRO subdivided the three components into seven distinct processes:

a. Sensing: the process by which the organization acquires information about the external and internal environments.

b. Communicating information: the process of transmitting information that is sensed to those parts of the organization that can act upon it.

c. Decision making: the process of making decisions concerning actions to be taken as a result of sensed information.

d. Stabilizing: the process of taking actions to maintain internal stability and integration that might otherwise be disrupted as a consequence of actions taken to cope with changes in the organization's environment.

e. Communicating implementation: the process of transmitting decisions and decision-related orders and instructions to those parts of the organization that must implement them.

f. Coping actions: the process of executing actions within an environment (external or internal) as a consequence of an organizational decision.

g. Feedback: the process of determining the results of a prior action through further sensing of the external and internal environments. It is important to note that each of these organizational processes is related to one of the components of competence. The relationships are as follows:

COMPETENCE COMPONENT	ORGANIZATONAL PROCESS
Reality Testing	Sensing, Communicating Information, Feedback
Adaptability	Decision Making, Communicating Implementation, Coping Actions
Integration	Stabilizing[43]

Using a combat simulation, HumRRO found a strong relationship between organizational competence and mission accomplishment. This led to the conclusion that organizational competence is a principal determinant of combat effectiveness.[44]

This is an organizational view, "the ability of an organization to continually and accurately sense the properties of both its external and internal environments, to internally process the information that is sensed, and to flexibly adapt its operations to cope with its constantly changing environments in accordance with its goals or missions."[45]

There is nothing particularly new here. Organizations have always performed these processes and, to some extent, leaders have been aware of them. Until recently, the integrated system comprised of these processes has not received much direct attention, possibly because of their obviousness or their relative ambiguity.[46]

The most normal military response to the need to be prepared to react quickly to changing situations is the development of set responses for different types of contingencies. These take the form of standing operating procedures (SOP) or tactical battle drills. They help structure the internal environment, reduce the complexity of decisions, and facilitate the process of communicating decisions and instructions. They also improve the probability of appropriate responses because the action elements are familiar with the procedure to be followed.

> "Formal procedures are imperative for the effective functioning of any organization, and there is no argument for neglecting them. However, over-reliance upon standardized responses leads to organizational rigidity. Effectiveness in the fast changing environments

of today requires high levels of flexibility, a quality that is essential in uncertainty situations and that has its source in (TAC_R)."[47]

Research accomplished for the US Marine Corps supports the importance of the flexibility and adaptability which are the indicators of a high level of tactical readiness. Historical analysis of the performance of 22 Marine Corps battalions in combat led the research team to conclude that the adaptive behavior of the battalions was the most important component of combat effectiveness. Since learning is adaptive behavior, the Marine Corps is investigating a new evaluation approach. The concept is to record not only what the unit does well, but also how quickly it adapts. Further research will address means to evaluate how quickly the unit improves in the areas where it initially performed poorly.[48]

The HumRRO study addresses training and builds a case for the development of training programs whose primary training objective is the development of process skills.

> "The effective performance of dynamic organizational processes requires that individuals and groups see and feel their actions in realistic situations and have the opportunity to obtain feedback concerning results of the actions so that further modification may be accomplished. Accordingly, experiential training is the technique of choice for competence development. Methods such as role playing and role simulation, administered in realistic organizational settings, supplement conceptual analyses of competence and its components, and provide opportunities for students to vividly experience the results of their actions and relate their behavior to that of other organizational members in a meaningful way. Knowledge of the requirements for effective process performance, when coupled with controlled experiences in education, can be expected to result in decided improvement in the leadership and managerial performance of individuals."[49]

The organizational processes expressed by the term TAC_R are important to the combat effectiveness of all echelons. It can be hypothesized, however, that TAC_R increases in relative importance to TNG_R when moving from lower to higher levels. At the lower echelons, the internal environment (unit structure) is relatively simple and homogeneous. The small unit functions primarily within the framework of the larger unit. As a result, its external environment is quite controlled and benevolent. The responses it must make to its environment are fairly simple and can usually be met by a TNG_R type essential task or battle drill.

At higher levels, the situation changes. The unit itself is more complex and its missions more varied. Larger units operate with greater independence than smaller ones. This creates a much less structured and predictable external environment. The appropriate responses to environmental change become far more numerous and complex. It becomes increasingly more important that the unit be proficient in the smooth performance of the elements of TAC_R than that it has mastered a series of set "drills" or SOPs.

Although there is no research to support this, the crossover point seems to occur at battalion level. Below battalion, the key tactical plays and SOPs which are the components of TNG_R define the unit's processes well enough to be the focus for training and evaluation. At battalion and above, TAC_R becomes so important that the Army must focus attention on it as a key component of combat effectiveness.

At present, the existence of this crossover point is supported by very little corroborating research data, although the Army's organizational structure does seem to suport the contention. The battalion is the first level at which matters become so complex as to require a formal staff. The presence of a staff is an indicator that the environment has become sufficiently complex to require competence in detailed procedures, and it is a complicating factor in itself. By its very existence, the staff makes the processes of TAC_R more complex and, therefore, more difficult. Individuals and subordinate units can take care of the procedures and "drills." The organization as a whole, controlled by the commander, must integrate the individual elements into a coherent entity, able to accomplish its mission in a difficult environment.

While the opportunity to develop and evaluate TAC_R has always been present in command post and field training exercises, developments in training technology are providing the Army a greatly expanded capability. Tactical engagement simulation, with its realistic portrayal of the battlefield, will permit a training environment very close to the reality of warfare. This will provide a much improved vehicle for the experiential learning necessary for the development of TAC_R. When coupled with the instrumented range capability projected for the National Training Center, the available feedback will be greatly enhanced. Not only will TAC_R improve more rapidly with this capability, it will be possible to gain insights into the TAC_R of the Army as a whole, using data collected on the units which train there.

A capability for command group experiential learning is available now. A whole range of manual and computer-assisted battle simulations are available or under development. These have an exceptional value in the development and potential evaluation of TAC_R. Specifically, gaming simulations:

a. Avoid the high opportunity cost of using troops as "training aids" for command group training (unlike many FTX);

b. Permit a wide variation in situations and mission requirements (forcing the command group to exercise flexibility and develop innovative solutions to constantly changing situations);

c. Enhance and structure "replay" and feedback capabilities;

d. Permit exercise repetitions to improve poor performance or try alternative solutions;

e. Create situational realism often unmatchable in more traditional training (effects of firepower, realistic enemy force, and variations in terrain and weather);

f. Provide an environment where occasional failure does not have an adverse effect on the winning attitude of individual soldiers; and

g. Provide data-keeping ability for assessment of success and evaluation of competence.

Within a command group gaming simulation, it is possible to create a series of progressively more difficult exercises, each designed to stretch the capability and flexibility of the command group. An example of such an exercise for a brigade command group might include the following scenario:

> Brigade plans for conduct of active defense and occupies initial defensive positions. Sustains an attack by a division-sized force supported by massive artillery fires. Simultaneously, must react to enemy airmobile assault in the rear of the brigade area. Adjusts to compensate for sudden loss of two companies. Continues defense.
>
> On short notice, brigade receives order to conduct night withdrawal from defensive positions and conduct movement to contact/hasty attack against the flank of an enemy attack. Receives operational control of an attack helicopter platoon and attachment of a German tank battalion en route. During the march, brigade is struck on the flank by the advance guard of an attacking division. Undergoes air strike from misoriented friendly aircraft. Brigade, now isolated behind the advancing enemy receives order to conduct offensive operations against artillery positions and break out to rejoin friendly British unit. During consolidation and reorganization prior to carrying out this mission, brigade sustains attack from small enemy reserve force and is presented an opportunity to attack a supply column and an air defense site.

Such scenarios can be developed rapidly. The battles can be conducted in near real time. The results can be replayed for critique and/or a new start to try a different solution.

To date, these simulations have been used effectively for training purposes. In this role they enjoy increasing acceptance. They have not been used as evaluation tools. Concern that such use would instill a fear of failure, and destroy the simulations' training value, is the primary reason for this. Other reasons have been the suspicion that the simulations are not realistic and the feeling that "success" in a simulation has not been adequately defined.

The required research in this area will be relatively simple. Comparative analysis of the various training vehicles (FTX, CPX, training exercises without troops, manual games, computer-assisted games) will almost certainly establish that most of the computer-assisted simulations and the better manual simulations create an environment which provides more realistic stimulus and response in interaction with the command group than the more traditional training evaluation vehicles. It is anticipated that even the field training exercise, sine qua non of traditional training, will not fare well in such a comparative analysis.

Since a simulation simply recreates the battle, evaluation can be conducted in the same manner as an FTX--the primary differences being the degree of realism and the availability of objective combat results. Work Unit Forge methodology suggests a means for direct assessment of TAC_R. The potential loss of training value if the simulations become evaluation tools should be reassessed in view of the Army's need to establish a measure of its combat effectiveness in terms of tactical readiness or organizational competence. The capability is available if the Army wishes to exploit it.

Personal/Leadership Readiness

The sixth and final component, personal/leadership readiness (P/L_R), represents an assessment of the leadership climate of an organization and the leadership ability of its subordinates. Leadership is a major factor in the combat effectiveness of a unit. "The most important, and least understood, element of combat power is leadership effect. Given the same parameters, good leaders can generate many times more combat power than mediocre ones. Leadership is the element, which when combined with firepower effect, maneuver effect, and survivability effect, becomes combat power."[50] Further,

> "It is not enough that the leader be technically proficient, understand the capabilities he can exercise, be able to analyze complex problems, and communicate effectively. He must also have the inner drive to apply these abilities to a given task.

Professional dedication, commitment and moral force are key in the development of combat power, and are a function of selection and motivation. Professional dedication ensures that the day-to-day tasks are performed in a highly competent manner. Commitment ensures that the given combat mission is carried out to the best ability of the individual, and moral force is the quality in the commander which transmits the same dedication and commitment to his subordinates."[51]

General Harold K. Johnson addresses the subject of leadership by describing a personal experience. At the beginning of the Korean conflict, he assembled a battalion and deployed to Korea on extremely short notice. The majority of his personnel had eight weeks of individual training, but no unit training. The battalion moved directly into combat, and although it took relatively high casualties, it never "broke." General Johnson attributes the unit's success to two factors. First, he had a stabilized cadre of officers and key NCOs. Second, he was determined that the battalion would not fail. He states that leaders who are determined to succeed are the key to unit success.[52] This experience illustrates a point which is a major strength of the US Army. The determination and leadership typified by this example have repeatedly extracted success from situations in which any objective assessment could only predict failure.

The ability of a unit to exceed its apparent capabilities is a direct result of the leadership climate. The capability to excel and the attitudes which support it can be extended and reinforced by the occasional requirement for the unit to outperform its capabilities in instances where the need is obvious to all concerned. This capability can wither and disappear if it is not exercised or if it is expected too frequently or for trivial reasons.

This same attitude becomes a problem when it is abused. It is possible for poor leaders to use the "can do" attitude to create an atmosphere in which subordinates feel that legitimate problems may not be surfaced, that only good news is acceptable, and that nothing but rosy optimism may be reported.

Personal/leadership readiness represents something more than the leadership and charismatic effect of the commander. Units have personalities which influence the manner in which they, as a collective body, go about their business. Unit tradition and esprit affect mission accomplishment. The attitudes instilled by past commanders or by subordinate leaders, and modified by previous experience, all shape the climate in which the unit operates and its approach to mission accomplishment.

The effects of P/L_R are not well understood. There are units which always seem to be effective. Their habitual superior performance can carry mediocre leaders, the personality of the unit augmenting the quality

of the leadership. Conversely, there are units which have required a very high order of professional leadership to enable them to accomplish seemingly easy tasks.

This element of unit "personality" must be considered when evaluating the leadership climate of an organization. In itself it is intangible. When combined with the equally elusive leadership qualities of the commander, evaluation of either one, or of the combined effect of both, becomes extremely difficult.

Although this evaluation task may be difficult, it must be addressed because it is often the most important aspect of a unit's combat effectiveness. An account of the use of analytical techniques in Vietnam indicates, "A confusing element in the (effectiveness) equation is that outstanding leadership (military or civilian) transcends or overrides the standard rules. In many cases...the individual commander's ability, skill, and knowledge transcended the more tangible factors."[53]

Leadership climate can be the most important of the combat effectiveness components. All of the functional aspects of an operation may go well, but the unit may still fail to accomplish its mission. On the other hand, history is replete with examples of units which achieved their mission despite functional failures. In many cases, these seemingly aberrant results can be traced to the quality of leadership. It is tempting, however wrong, to sum up all the intangibles which influence combat effectiveness and attribute them to "leadership."

There have been numerous attempts to define and describe leadership. The traditional focus was on leadership traits, or the characteristics of good leaders. Lists of leadership traits served a purpose but suffered from two major shortcomings. First, they tended to become collations of the admirable qualities of people who were recognized as good leaders, with no clear establishment of the extent to which the traits were components of leadership. Second, there can be no clear-cut set of leadership traits appropriate for all people without regard for the leader's personality or the job situation.

Recognition of the shortcomings of "leadership traits" caused theorists to focus on the interactions between the leader and the led. In the Army, the result was a set of prescriptive principles which described how leaders should behave. These leadership principles were validated by, and formed the basis for, the Army War College's Study of Leadership for the Professional Soldier. The 11 principles were:[54]

a. Be technically and tactically proficient.

b. Know yourself and seek improvement.

c. Know your men and look out for their welfare.

d. Keep your men informed.

e. Set the example.

f. Ensure the task is understood, supervised, and accomplished.

g. Train your men as a team.

h. Make sound and timely decisions.

i. Develop a sense of responsibiltiy among subordinates.

j. Employ your command in accordance with its capabilities.

k. Seek and take responsibility for your actions.

Although these are useful principles for Army leaders to follow, they do not address differing leadership requirements stemming from the nature of the task and the work environment.

One of the USAWC Leadership Study's findings provides a clue, borne out in subsequent research, that these principles do not encompass the entire subject of leadership. Finding number five states that "the perception of the relative importance of specific leadership principles varies among grade levels."[55] This could be interpreted as being different perceptions of a monolithic reality. Alternatively, one might conclude that the reality differs--that, at varying levels of command, the relative importance of specific principles varies.

This latter possibility appears again in research done in Work Unit Forge. This research found that command position influences officers' evaluations of certain leader actions. Whereas battalion commanders did not differentiate between command levels as to the desirability of certain leader actions, company commanders did differentiate between command levels with regard to actions concerned with centralization of authority and responsibility.[56]

Clement and Ayres focused on the situational aspects of leadership to group behavioral components in a construct which facilitates the derivation of similar leader tasks for individuals engaged in similar work. Their search was for discrete behavioral elements which could lead to prescriptive training objectives. This led to the delineation of nine functional areas or leadership dimensions:[57]

a. Communications

b. Human Relations

c. Counseling

d. Supervision

e. Technical

f. Management Science

g. Decision Making

h. Planning

i. Ethics

If Clement and Ayres had stopped there, the result would have been simply another classification of a set of behaviors similar to the principles cited in the Army War College Study. For example, "Be technically and tactically proficient" correlates to the technical dimension. "Make sound and timely decisions" is the decision-making dimension. "Keep your men informed" and "Ensure the task is understood" are derived from the communications, human relations, and supervision dimensions. Clement and Ayres went on to the further development which was suggested by the comments in the War College Study and Work Unit Forge. They established that there are major differences within each of the leadership dimensions and that these differences strongly correlate with organizational levels.

The result was a matrix of organizational leadership behavior which matches the nine leadership dimensions with five levels of military (officer) leadership. The differences within the dimensions are striking. In the supervision dimension, the first line leader (lieutenant) enforces organizational rules. The middle level (major/lieutenant colonel) performs quality control tasks. The executive (general officer) maintains the total organizational perspective. In the technical area, the lieutenant performs a military occupational specialty and utilizes equipment. The major/lieutenant colonel comprehends advanced technology and consults technical experts. The general officer relies on technical experts.[58]

The matrix is complex in and of itself. Its implications are still in the initial stages of assimilation. The Army's concept of what is important regarding the subject of leadership is still developing, both in context and content. It represents a solid first step in outlining the kinds of tasks which should be included in leadership training. Although not ready yet, it has long term implications for assessment of the operational effectiveness of units.

In addition to the evolutionary nature of the Army's understanding of leadership, there are conflicting signals within the body of leadership research. Dr. Fred Fiedler was disturbed by the research community's inability to show that leadership training or experience improves organizational or group performance. He employed his contingency model of leadership effectiveness to investigate what he felt to be an embarrassing problem.

The contingency theory postulates that the effectiveness of a group is dependent on two interacting variables--the motivational system of the leader (relationship or task motivated) and the favorable situation in terms of leader-member relations, tasks structure, and position power. Leaders with differing motivational orientations perform poorly or well depending on the favorable or unfavorable situation. The effect of leadership training changes the favorable situation (e.g., by changing the leader's human relations skills and, therefore, leader-member relations) in such a manner as to move from 1/3 to 1/2 of the trainees into situations in which they would actually be less effective than they were before participating in the training.[59]

The obvious implications are that we do not know all there is to know about leadership. We probably do not understand all that we know. It is a small surprise that measurement of the "amount of leadership" present in a unit has not provided particularly useful results.

The officer efficiency report (OER) is the means by which the Army evaluates its leaders. It is not necessarily a "leadership" evaluation, partly because it is also used to evaluate officer performance in jobs which do not require leadership. Part IV of DA Form 67-7, US Army Officer Evaluation Report, includes 16 questions which address the rated officer's professional attributes. These questions correlate closely to the principles of leadership mentioned earlier. The narrative portions of the report provide opportunities for raters and endorsers to comment on the rated officer's leadership ability.

A leadership theorist could mount an attack on the principles of leadership expressed in the OER. These principles could be said to be characteristics displayed by good leaders or descriptors of the manner in which the Army thinks its leadership should conduct their professional lives. It is not clear, however, that these principles are the direct causative factors, which, if employed, will induce followers to subordinate their interests to those of the unit, motivate them to focus their best efforts to achieve unit goals, and cause them to rise above themselves to accomplish seemingly impossible tasks.

The validity of the principles of leadership aside, there are two significant reasons why the OER will not serve as a measure of the leadership climate within units. First, it evaluates individuals rather than the effectiveness of units as a result of leadership. Second, the OER system is inflated to the point where it is extremely difficult to draw a clear picture of either the rated officer or his leadership qualities from one or two OERs. Career managers feel a need to review a complete file before they can assess an officer's personal and professional qualifications. If one or two OERs are not adequate to evaluate an officer, extrapolation from the individual to the unit would be an undertaking with very doubtful prospects for success. Such an extrapolation would be necessary if OERs were to be used as "spot" indicators of the quality of

the leadership climate in a unit at a particular time.

The significant strong point of the OER system is that it consists of an evaluation by the one man in the best position to assess the rated officer and his situation--the immediate supervisor. Although some raters may not be able to articulate their assessments and the system may militate against an unbiased evaluation, no one other than the immediate supervisor is in a position to determine the extent to which the subordinate has exercised leadership to cause the subordinate's organization to accomplish the rater's goals for that organization.

In the early 1960's, the Army Research Institute tested a system for developing an index of unit leadership climate based on forced choice questionnaires. It was intended to be used by a commander to evaluate his subordinates' perceptions of the general atmosphere of the unit. The report indicates that the product is usable only as a self-evaluation exercise. It is not appropriate as a tool for outside evaluation.[60]

The "leadership climate" instrument is a useful tool to help a leader understand his leadership situation and his effect on his unit as perceived by his subordinates. It does not define "good" or "bad" environments.

As Fiedler found in the previously cited research, "good" or "bad" environments can only be determined in the context of a particular leader's motivational style. Whether or not one agrees with Fiedler, his work reinforces the position that we do not yet know enough about leadership or leadership climate to have much faith in the ability of outside inspection teams to evaluate a unit's leadership climate as a separate phenomenon.

The Army can assess leadership quality in terms of how well a unit performs its daily activities. This assessment must be conducted in the context of the unit's total situation and tempered by the requirements and expectations of the next higher commander. Within this construct, a commander can subjectively evaluate the effect which his subordinate commanders' leadership has on the unit's combat effectiveness. Trained organizational effectiveness specialists can assist in this determination. Assessment tools such as the leadership climate survey can be helpful to a commander. More research is needed, however, before objective assessments or "leadership indices" can be used to state the combat effectiveness of the Army as a function of leadership. The leadership matrix developed by Clement and Ayres gives the Army a direction for further research in this area. Until this has been done, P/L_R must be the subjective evaluation of the unit commander.

Translation Vehicle

Six components of combat effectiveness were addressed in the preceding sections. These components, Weapons/Equipment, Personnel Readiness, Logistic Readiness, Training Readiness, Tactical Readiness and

Personal/Leadership Readiness, were chosen because they provide a set of building blocks well suited to focus the subelements of combat effectiveness into the different formulations needed by different decision makers. Each has the essential quality of being a discernible characteristic of the Army in the field. Taken together, they define the essential characteristics of combat effectiveness.

WPN, $PERS_R$, LOG_R, and TNG_R can be expressed qualitatively or quantitatively. The Army probably has the capability to develop indices of TAC_R, but, for the time being, this component should be addressed subjectively. P/L_R can be discussed subjectively but it is not measurable. Nor can the extent to which the Army has P/L_R be expressed subjectively at this time. At best, it can only be addressed in terms of a unit commander's subjective assessment of the leadership climate of his unit.

Dividing combat effectiveness into the proposed elements encourages balanced judgments by ensuring that consideration is given to all components. If one of the components is not needed for resolution of a particular problem, it need not be included. The proposed classification system helps to prevent improper omission by oversight. Because this system separates the quantifiable from the subjective, it assists the decision maker to make maximum use of the available analytical tools without losing sight of, or trying to quantify, the components which cannot be reduced to numbers and which may be the decisive factors in the outcome of battle. The commander views his unit as shown in Figure 6-2. The basic weapon system is a composite of the four objective components and a small amount of tactical readiness with a solid underpinning of personal and leadership readiness. The small unit melds a number of basic weapons systems into a whole with a somewhat larger proportion of TAC_R and, again, P/L_R. The larger unit combines a number of small units. TAC_R has become larger and, as always, P/L_R acts as the basic foundation.

This view can be transmitted to commanders and resource managers in the form of a revised URR which includes five of the components in separate sections. There is a need and capability to address $PERS_R$, LOG_R, and TNG_R in quantitative terms. TAC_R and P/L_R can be addressed subjectively as a commander's evaluation. Before this can be done, it will be necessary to devise assessment guidelines for a commander's use in evaluation of the tactical readiness and leadership climate of his unit. The design characteristics contained in the WPN component are not required for purposes of the URR. WPN serves as the translation vehicle for inclusion of the other factors into simulations.

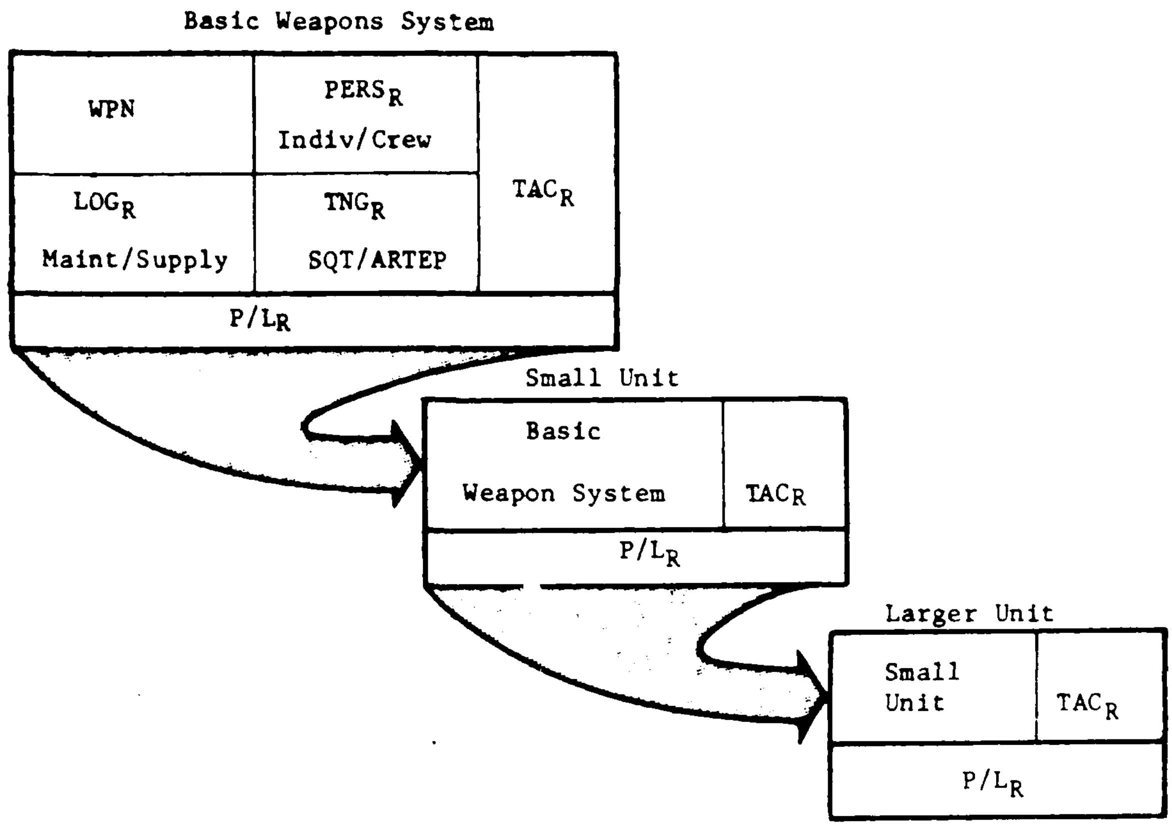

Figure 6-2. Combat Effectiveness

At present, P/L$_R$ and TAC$_R$ are not amenable to inclusion in simulations. We do not now reliably possess this capability. The work done with the CDEC real-time casualty assessment system indicates, however, that overall unit performance can be determined using a reliable engagement simulation system on an instrumented range such as is envisioned for the National Training Center.

If so, the Army will have developed a capability to correlate its present measures of combat effectiveness with performance on a very close approximation to future battlefields. This will provide an opportunity to validate concepts regarding the relationships between training proficiency and combat effectiveness.

CHAPTER VII

MEASUREMENT AND VERIFICATION FOR THE FUTURE

General

It is only reasonable that the United States should expect to know what it is getting in return for the millions of dollars which go into training the Army. Beyond that, there are three major reasons why the Army needs to determine its combat effectiveness and verify its state of training proficiency. First, it needs to know its true status as a basis for making force development, doctrine, and contingency planning decisions. Second, an estimate of combat effectiveness is required for intelligent resource allocation decisions and to develop a credible case for resource requirements. Finally, and possibly most important, credible verification is a solid fulcrum on which to use the powerful leverage of competition. With a verification tool which the American soldier perceives as important, meaningful, accurate, and honest, the competitive spirit, which is one of his strongest cultural values, will come into play. In such an environment, soldiers at all levels will find unique ways to use the available resources to achieve the greatest possible proficiency levels.

Desirable Features

A good verification system must have certain features. Some of these desirable features are not compatible, the requirements imposed by one conflicting with the implications of another. The task, then, is to balance the features, arriving at an acceptable compromise.

A verification system should, first of all, be meaningful. It must provide the required information to the right people in a usable form. For the Army, commanders at all levels need an overall indicator of combat effectiveness and a narrative description of strengths and weaknesses in a variety of areas, such as equipment capability, personnel, logistics, individual skills, collective proficiency, organizational competence, and leadership climate. Resource managers need the same kind of information, but they need it in a format which communicates resource implications. They need to know what is quantifiable and what is subjective. Overall combat effectiveness, strengths and weaknesses must be convertible into people, dollars, and time. Force developers and strategic planners need narrative accounts but they also need the ability to enter the variables

of combat effectiveness into the computer simulations which assist in decision making.

A verification system must be accurate. It must describe the Army as it really is, in unequivocal terms. That which is known must be separated from that which is only an estimate, and both must be identified for what they are. Verification criteria must be precise enough so that all the people involved understand what is being measured and what the report means when it is submitted.

Accuracy implies currency. Outdated information may be misleading because of a changed situation. The frequency of verification techniques should be influenced by the rapidity of change. The evaluation of tasks which are highly perishable, such as gunnery skills, must be conducted more frequently than more stable considerations such as the kinds and amount of equipment available.

Such a system must also be fair. A lack of perceived fairness may have been a prime reason for the current problems with the training section of the URR. It was simply not fair for the command structure to demand performance when it could not provide the means (training resources) with which to perform to the desired standard. This unfairness certainly contributed to the tendency for honest men to stay within the technical limits of the reporting system but to rationalize their reports to reflect a higher level of readiness than was actually the case.

This system must support integrity, rather than detract from it. The Army has a very high standard of integrity which is essential and must be encouraged. If people believe that others advance by being less than honest, the standards of integrity are strained and it becomes more difficult for the individual to maintain his own ideals. In any situation where there is an apparent reward for dishonesty (as is the case with any self-reporting system), there must also be countervailing sanctions which cause the penalty for dishonesty to be more distasteful than the apparent benefits are appealing.

Lastly, a verification system must be affordable. It would be possible to develop a system which required constant, detailed updating of everything which was conceivably usable. The cost of such a system, not only in dollars but in managers' time, would be prohibitive. There must be a balance between perfection and practicality.

A Composite System

The Army's needs for assessment of its level of combat effectiveness can be satisfied by a composite verification system. Modification of the URR can provide appropriate quantification and parallel subjective assessment of the state of combat effectiveness as influenced by training. External inspection teams administering tactical evaluations can provide an

indicator of accuracy, assure quality control, and provide a meaningful incentive. Careful structure of URR and tactical evaluation reports permits training data input to the computer simulations which are used to assist the decison-making process.

URR Modification

The SSI report on unit readiness reporting found almost universal agreement that there is a need for a readiness reporting system and for that system to produce valid and reliable results. This is not the case at present. The system is in disrepute, permits inflation, masks problem areas, and is strongly influenced by the perception that "C" ratings are used to judge command performance.[61]

One of the major problems is that there is now no system for formal verification of the training proficiency of the Army. The ARTEP has not been linked with unit readiness reporting, and ARTEP results are not submitted to higher headquarters. The SQT is a formal evaluation of individual proficiency which is used by the military personnel system for personnel management purposes, but it is not used as an indicator of the combat effectiveness of units or of the Army as a whole.

Both ARTEP and SQT purport to be compilations of the minimum critical tasks which must be performed to succeed and survive in combat. Although there are serious differences between concept and reality regarding ARTEP and SQT, they are far better, more objective measurement tools than the Army has ever had before. Reliable, consistent evaluations are possible with ARTEP and SQT now. The capability for validity and objectivity will improve as new training developments reach the field. A quality control mechanism exists for SQT but not for ARTEP.

SSI believed that the training portion of the URR is probably the least valid of the resource areas reported. It is purely subjective and based on assumptions which are scarcely believable. The Institute concluded that there is a very strong body of opinion within the Army which believes that the training portion must be quantified.[62] This is feasible if the URR is expanded to include objective measures of TNG_R--individual and collective proficiencies which can be evaluated in results-oriented assessment and those procedure-oriented assessments which are clearly acceptable. Obviously, these quantitative reports should be based on the essential tasks and "battle drills" which are of supreme mission importance or which serve as training multipliers, requiring performance of many derivative skills. At the higher echelons, battalion and above, a narrative and subjective assessment of TAC_R is a necessary accompanying component. The requirement for this subjective analysis will become less as the capability to provide results-oriented assessment is enhanced with better simulation and improved instrumentation.

A major improvement in terms of accuracy and objectivity could be made as the SQT is implemented for each MOS by eliminating the present system for calculation of MOS qualification. Insertion of the unit's summary data for SQT scores in the training portion of the URR is a logical use of the SQT system. This system already has an elaborate mechanism to ensure consistency, quality control and honesty.

The SQT data is already provided to the battalion in a format which is almost directly transferrable into a revised URR. It could also be available to higher levels of command collated in any number of ways. Since SQT results are already automated, the possibilities are limited only by the capability of the automatic data processing system.

The currency of SQT data must be questioned because of unit turbulence and time between testing. Without belittling the magnitude of this problem, it is a mechanistic operation which can be solved, although not without deliberate testing and paced introduction.

Although the ARTEP is not embedded in a formal system like the SQT, it provides the best capability the Army has ever had to evaluate performance of specific, combat-referenced missions in terms which are either objective or identifiable as subjective. The results-oriented and objective procedure-oriented assessments should be included in TNG_R and the remainder assigned to the TAC_R portion of a revised URR. The self-reporting aspects for URR purposes should be reflections of the periodic testing required to determine the unit's proficiency levels on key skills and essential tasks. Since such testing is necessary for diagnostic purposes, the reporting requirement will produce minimal additional workload.

An objective section on TNG_R becomes acceptable because of its separation from the subjective aspects of TAC_R and P/L_R. These subjective aspects should be addressed in a section specifically reserved for commander's comments.

These changes to the URR provide meaningful narrative input to the commander, resource manager, and strategic planner. Separation of the objective data from subjective assessments permits greater confidence in the report and enhances the accuracy of summary data regarding the objective section. The changes encourage clear thinking about what can reasonably be included in decision-assisting simulations. They provide a source of accurate and relatively current input data. The data could become more useful by changing the training C1-4 rating to a rating of "combat ready"--fully capable of performing the combat mission against numerically superior enemies--or to ratings of combat ready minus the training days required to "train-up" to become combat ready--5, 10, 20, etc. The training days should be based on a predetermined mobilization training package and on the training required for full combat proficiency balanced against the training which the unit cannot conduct prior to alert or mobilization due to resource constraints or other limitations.[63]

One probable implication of these proposed revisions is that the Army's readiness ratings as reported to the Joint Chiefs of Staff will drop. This is not an indication that the Army has been dishonest in the past. It is an indication that the Army has never had as clear and objective a verification capability as it is developing now. It is only now becoming aware of its improved capability to determine actual readiness. As it integrates this capability into the readiness reporting system, it should not be embarrassing if actual effectiveness falls somewhat short of previous estimates.

Inspection Teams

Use of DA or MACOM training inspection teams may be necessary to provide consistent, and therefore accurate, standards of reporting, and to provide a measure of credibility by acting as a countervailing force against the tendency for inflation. Both the credibility of inspection results and the degree to which training standards appear to be centralized will likely seem more pronounced as one moves upward through the various command levels from division to MACOM to DA.

The presence of such inspection teams would transform the nature of the pressures to produce high readiness reports. The pressure for high reports would change from pressure to look good on paper to pressure to actually be good. The predictable effect is that the URR will become a vehicle for the commander to "tell it like it is," delineating his strengths and weaknesses and highlighting problem areas which detract from the maintenance of appropriate levels of training proficiency. It gives the commander an opportunity to tell the Army his problems.

The need for inspection teams seems clear. There are three certain benefits:

a. Establishment of an objective and accurate verification of the Army's training proficiency for purposes of determining resource requirements.

b. Affirmation to commanders that training is truly important in the eyes of the Army, not an afterthought which is addressed when other areas are inspected or evaluated.

c. Elimination of a perceived source of dishonesty within a profession which can tolerate only the highest standards of integrity.

This direct quote from the SSI report addresses the question of external evaluations (treated as training inspections in this paper):

> "a. Discussion. A recurring comment touched upon the advisability of independent, unannounced and random evaluations of training readiness reports.
>
> (1) One might expect a decided aversion to outsiders moving into the internal affairs of a unit.

It is not so in this case. In order to provide an incentive for accurate reporting, many would welcome DA inspection teams; failing this, inspections by trained teams from above installation level.

(2) Only as a last resort would local inspections by elements within the chain of command be desired--and then by as many levels above the respective reporting unit, as possible. It is significant that even these less acceptable solutions are considered better than the present situation.

(3) An interesting and frequent suggestion was that any unit which reports a C-1 should shortly thereafter be required to substantiate this rating by undergoing some form of operational test, for example, an alert or mobility exercise or an external evaluation.

(4) These suggestions indicate a recognition of the dangers of bias and distortion in any subjective self-rating system.

b. Conclusion. Considerable sentiment exists for some form of performance verification of training readiness ratings by outside observers."[64]

As one element of the verification process, tactical evaluation or training inspection teams should not be "ARTEP evaluation teams." This shift from the term "ARTEP evaluation" gives the Army an opportunity to reestablish a measure of credibility within itself. While the rhetoric has repeatedly maintained that ARTEP is a training tool, not a test, large segments of the Army perceive it as a test. The existence of "tactical evaluations" and "tactical evaluation teams" which are, in fact, testing mechanisms, provides an opportunity for ARTEP to assume its intended role as a training and diagnostic instrument, used in preparation for the tactical evaluation. Care must be exercised to ensure that these teams remain an instrument of the chain of command, not a substitute.

The Army needs to know its normal level of training proficiency, not the peak it can reach given long preparation time. For this reason, tactical evaluations should be conducted on a short-notice basis. Probably, a unit should be provided preparation time equivalent to the time available between D-Day and the unit's anticipated entry into combat. Under this concept, units in Germany would receive only a few hours advanced notice. Active units deploying from the United States would receive notification comparable to that provided by their deployment schedules. Since there would be no actual mobilization in peacetime, the Reserve Components should not participate in such a schedule. However, preannounced evaluation during active duty training seems most appropriate for the Reserve

and National Guard. Planning of this nature would permit appropriate allocation of training resources to the units whose deployment schedule allows the least available training time.

Whether the inspection teams are from division or higher levels, personnel resources will be a problem. The personnel for these independent inspection teams should be carefully selected, properly trained, and imbued with a strong sense of mission. This is particularly important because of the current distrust of the validity of any measures of collective training proficiency. To be successful, inspections must be well conducted, done fairly, and accepted as such by the field. The cost in quality personnel is high, but the benefits are great. The Army has in the past found it worthwhile to dedicate quality personnel assets to maintenance inspection teams and Reserve Component Assistance Teams. The training verification issue is of equal or greater importance.

There may be ways to reduce the impact of the personnel requirements. One alternative could be use of the Reserve Components' Maneuver Area Command and Maneuver Training Command structure and expertise. This could be feasible if the organizations were augmented with Active Component personnel and, possibly, with full time positions for Reserve Component personnel.

Another alternative could be to augment the full time members of a division or higher level inspection team with TDY inspectors from various officer education courses. Often an inspector learns more from an inspection than the members of the unit do. Part of the course of instruction for the officer advanced courses and the Command and General Staff College could be a week or more of work/study as an inspector on a training inspection team. The teams would have a source of high-quality inspectors. The students would receive a firsthand, "feet on the ground" look at the Army in the role of a disinterested observer, something which could be an invaluable experience in the officer's education.

To maintain fairness, inspection standards for a unit should be reasonably constrained. A unit must not be expected to achieve a proficiency standard higher than that achievable within the resources which have been provided. This requirement emphasizes the urgent need to make a formal link between training proficiency, training programs and training resources.

Training Input to Simulations

To develop the link between training proficiency and combat effectiveness in a format suitable to support decision making in the areas of strategic planning, force development, and resource management, measures of the Army's training proficiency should be translated from the URR and the results of training inspections into computer simulations. This effort will provide a means for observing the effects of individual and collective skill levels on the combat effectiveness of units. Such a research project could be structured around three primary tasks.

The first task is to develop a methodology that relates measures of individual and collective training proficiency to combat effectiveness at battalion level and below. This entails a literature search and preparation of a list of candidate methodologies concurrent with a review of SQT testing and obsevation of selected ARTEP evaluations. This will permit correlation of the methodologies with the available data to determine the suitability of each methodology or combination of methodologies and selection of a preferred methodology. Once this has been done, identification of appropriate data sources, validation of data requirements, and an implementaion plan can be developed concurrently.

The second task involves the use of the products from the first task. When the appropriate model has been adapted to measures of training proficiency, it will serve as the vehicle for developing a step-by-step plan for determining a preferred mix of training programs.

Integration of measures of training proficiency into high resolution combat developments simulations will facilitate an extremely important form of sensitivity analysis. The force developer's perpetual dilemma is to detemine where to invest resources to improve the Army's effectiveness. Integration of training proficiency, weapons design characteristics, and logistic considerations into a single simulation will serve as an invaluable decision-making aid since it will enhance the capability to engage in economic anaysis, determining the marginal effectiveness of differing investments in hardware characteristics, hardware quantity, training and doctrinal changes.

The third task is to provide the means to translate the combat effectiveness implications of training proficiency from a high resolution, small unit model into a low resolution model suitable for total force level analysis. This effort could provide an excellent capability to use large-scale simulations for strategic planning and resource allocation.

Benefits

The combined approach, employing self-reporting procedures, training inspections or tactical evaluations, and integration with war games makes it possible to satisfy the Army's need to verify training proficiency and combat effectiveness. The composite results will be meaningful to the commander, the resource manager, and the strategic planner. It will provide an accurate assessment of the current status of the Army's training proficiency. The combination of self-reporting and tactical evaluation facilitates consistency, completeness, and honesty without incurring unacceptable costs. The need is clear and the capability exists.

The Future

The introduction of MILES and sophisticated training devices for individual skills will improve the Army's ability to verify training proficiency

by providing a very realistic simulation of the interacton between soldier or unit and the combat environment. The results-oriented assessment possible with this improved capability will represent a major advance, permitting a realistic prediction of performance in combat.

This capability will culminate with full development of the National Training Center. Combining the realistic environment of MILES with the full-time opposing force and instrumentation of the NTC and a team of professional training inspectors will permit objective, consistent, and realistic performance measurement. Requiring a unit to deploy to the NTC will sever it from the administrative and housekeeping requirements of its home station and permit it to immerse itself in training mission accomplishment.

If the determination is made that no formal inspections will occur at the NTC, performance data, devoid of unit identification, will still be available. This will provide the Army's leadership a sample of unit combat effectiveness. Just as important, the NTC will provide believable links between training programs, training proficiency, and combat effectiveness. Concurrent development of a system for relating resources to training programs will complete the requirement. The Army can then account for the resources it consumes in training by demonstrating the returns--combat effectiveness.

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RESOURCE COST OF TRAINING

by

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CHAPTER I

HISTORICAL PERSPECTIVE

"The building of a military organization capable of deterring aggression without destroying our economy is an extremely complicated problem."[1] That statement remains valid today. The inability of the Army to quantify the training resource requirements necessary to achieve a stated level of readiness is a serious problem for those charged with the responsibility of allocating the Nation's resources. The following chapter discusses the means by which training resources have been allocated in the past, and it provides a historical perspective of the problem of relating training to resource requirements.

The national security objectives were originally rather conservative. As expressed in the Constitution, they were threefold: avoid involvement in foreign disputes; maintain internal security; and defend the borders. Many considered defense against the Indians to be the most critical task.[2] In 1789, the 1st Congress authorized a small, permanent military establishment. The States' militia, funded and trained by the States, had responsibility for meeting military emergencies. Such an organization was effective; for example, it allowed President Washington to call out the militia of three States to quell the Whiskey Rebellion.[3] At that time the Army's end strength, 80 privates and a proportionate number of officers, which had been authorized by the Continental Congress to protect the military stores at Fort Pitt and West Point, was increased to 840 officers and enlisted men.[4]

The first War Department appropriation under the Constitution was a single appropriation for $137,000.[5] However, as the Army grew to meet the demands of the Nation's westward expansion, military equipment became increasingly more complex and varied. This early proliferation of weapons systems not only caused supply and administration functions to become more taxing, but significantly increased the training resources required for the the new systems. Such resources were not always sufficiently available in the early 1800's. For example, a regiment of light artillery was prevented from training to its full potential because its horses had been sold as an economy measure.[6]

Technical service chiefs (e.g., Quartermaster General and Commissary General of Ordnance) soon became institutionalized within the War Department to cope with the increasing demands of administering to an expanding Army. The single congressional appropriation for the Army was replaced by a multiappropriations system. Each technical service chief prepared and

defended before the Congress his individual budget with little or no control exercised by the Secretary of War.[7] All the resources for supporting the Army in the field, to include both training and operations, were budgeted by the separate technical service chiefs. Notably, training resources were not identified specifically nor were they related to any particular training programs being executed in the field.[8]

Under this arrangement, coordination and command became difficult when the position of Commanding General of the Army was created, establishing a system of dual control. Army regulations stated that "The military establishment is under orders of the Commanding General of the Army in that which pertains to its discipline and control. The fiscal affairs of the Army are conducted by the Secretary of War through the several staff departments."[9] Thus, the Secretary of War had no control of the Army in the field; but of greater significance, the Commanding General of the Army had little influence in determining the resources required to support his training or operations. The responsibility for determining the level of supplies needed to train the field units was left to each of the technical service chiefs who, within the War Department, were virtually autonomous. Therefore, any effort to develop a coordinated plan for determining training resource requirements was seriously impeded. The dual control situation so infuriated Generals Winfield Scott and William T. Sherman when they were Commanding Generals of the Army that they moved their headquarters from Washington D.C. in protest.[10]

The formal organization of the War Department evolved through the years, expanding to include chiefs of various combat arms (e.g., Chief of Infantry) as well as additional technical service chiefs. It was not until nearly 1900 that training became widely institutionalized to cope with the complexities of training reguirements thrust upon the Army by its ever-expanding inventory of equipment.

The responsibility for institutional training belonged to the combat arms chief or the technical service chief within whose purview the training fell. For example, the Chief of Infantry's budget included the resources to conduct training at the Infantry School located at Fort Benning, while the training resources required by the Ordnance Service were contained within the budget developed by the Chief of Ordnance.

Just prior to World War II, the positions for the chiefs of the various combat arms were abolished and the funding for all combat arms training was consolidated in the Army Ground Forces' Training and Operations account. Training funds for technical service personnel, however, remained the responsibility of the individual technical service chief.

Reorganization Following World War II

Following World War II, many recommendations were made for reorganizing the military budgets. The Congress, however, continued to provide funds t

the Army according to an increasingly ineffective appropriations structure. Funding procedures did not permit identification of the real dollar costs for training or operations being conducted within the Army. It was virtually impossible to relate the Army's budget to its missions or functions since each technical service employed its own accounting system which did not include all its functions or missions.

> "The Army's budget [Fiscal Year 1949] reflected its fragmented organization. There were twenty-five major "projects" or appropriations classifications based upon the technical services, each with its own individual budget, which accounted for 80 percent of the funds spent by the Army."[11]

Impact of Hoover Commission Report

Some of the more significant criticisms of military budgets were contained in the National Security Organization portion of the 1949 Hoover Commission Report on Organization of the Executive Branch of the Government. One Commission recommendation had the greatest impact in the field on Army resource management by calling for "performance budgets," a deceptively simple concept. This concept focuses attention upon functions, missions, accomplishments to be achieved, or work to be performed. An appropriate function or mission of the Army may be the conduct of training sufficient to achieve a given level of readiness.

The Army budget at the time of the first Hoover Commission, however, was oriented on the Army's organization rather than on its functions or missions. It was impossible to relate the cost of training programs to funds requested in the budget. The Commission report provided the impetus for the National Security Act Amendments of 1949, (Public Law 216), which led to needed improvements in the financial management of the military services.

National Security Act of 1949

Section 403 of Title IV of the National Security Act Amendments was of particular significance. It "...called for adoption of performance budgets and new accounting methods which would account for and report the cost of performance of readily identifiable functional programs and activities...."[12] The Act did not, however, identify what the functional budget classifications should be. This task fell to the first Department of Defense Comptroller, Mr. Wilfred J. McNeil, who issued a directive in [illegible] replacing the Army's traditional, technical service-oriented budgets with the following eight broad functional classifications: Military Personnel; Operations and Maintenance (O&M), Procurement and Production; Research and Development (R&D); Military Construction; Army National Guard; Reserve Personnel Requirements; National Guard Military Construction; and Army Civilian Components. One observer commented, "With this one directive,

McNeil wiped out the independent budgets of the technical services dating back in some instances to the Revolution."[13]

Each of the eight appropriations served as a hierarchy of budget groupings which extended down four or five levels. An appropriation was divided into "budget programs," each of which was further subdivided into "projects," followed by "subprojects," etc. Institutional training was a "budget program" within the Operation and Maintenance appropriation. The training budget program, however, reflected only a portion of the costs of institutional training, since other such costs were included in other appropriations such as Military Personnel, Army Civilian Components, and Military Construction. Additionally, unit training costs were not identified specifically anywhere within the Operations and Maintenance appropriation, but were spread among a number of its "budget programs."[14]

The appropriation system established by Public Law 216 explained in detail through separate appropriations what it cost in terms of men, materiel, and services to support the Army. For the most part, however, budget requests were not related to specific outputs or programs, such as Army-wide training or a given number of divisions equipped, trained, and positioned for the defense of Western Europe. To a great extent, budget requests continued to be expressed in terms of products and services to be paid for. Consequently, the Congress made appropriations decisions without being able to evaluate the full impact their decisions would have on specific programs or activities.

Army's Program Budget System of the 1950's

As the 1950's approached, the Army's activities became dictated by strategic plans developed by the Joint Chiefs of Staff (JCS). The Army's plans and objectives had to flow from those of the JCS and, importantly, the Army had to convert those plans and objectives into action by means of specific directives and schedules for operations. Successful execution of the Army programs supporting the JCS strategic plans necessitated the development of improved procedures for allocating resources.

In the spring of 1950, the Army announced a new system which tended to associate resources with particular military requirements or programs. The programs "were intended to be concrete operational plans designed to translate JCS strategic plans into action. They were to include a detailed time schedule for meeting specific program objectives, the resources required in detail, and a means of reviewing progress."[15] All the activities of the Army were grouped initially into the following fourteen primary programs:

1. Troop Program	8. Industrial Mobilization
2. Command and Management	9. Major Procurement
3. Military Personnel	10. Supply
4. Civilian Personnel	11. Services
5. Intelligence	12. Installations
6. Training	13. Construction
7. Research and Development	14. Joint Projects

Figure 1-1. Primary Programs

The Army's program budget did not eliminate the Congressional requirement for the preparation of the budget displays established by Public Law 216. Rather, it was a parochial effort on the part of the Army to improve its planning and programming ability. The Army budget is still presented in two formats: a program format as well as the appropriation format established by P.L. 216. Interestingly, one of the Army's fourteen original programs, Program 6, was dedicated exclusively to training. This program was limited to operations and maintenance type expenses and therefore did not reflect the full cost of training. For example, the military pay of the trainers and trainees was included in Program 3.

A comparison of the Army's treatment of training in the appropriation and program budgets is shown below.

APPROPRIATION BUDGET	PROGRAM BUDGET
Operation of Schools and Replacement Training Centers	Basic and Branch Material Individual Training at RTC's, Overseas Commands, etc.
US Military Academy	Individual Training by the Army Schools System, at Civilian Institutions, etc.
Command and General Staff College	Unit Training
Language Schools	Army-wide and Joint Training Exercises
Technical Service Schools	Civilian Components Training, Including ORC, ROTC, and National Guard
Replacement Training Centers	Training Through Army Extension Courses
Miscellaneous Training Costs	Provision of Specified Facilities Such as Training Aid Centers and Instructional Material, Publications, Films, etc.
Training at Civilian Institutions	Specialized Post-Cycle Training
Production and Distribution of Training Films	
Training Aids	
Training Publications	
School Temporary Duty (Travel)	
Army Service TDY	
Other School TDY	

Figure 1-2. Budgetary Organization for Training[16]

It should be noted that the appropriation classifications focused primarily on organizations dedicated to training functions as well as particular objects of cost attributable directly to training activities. The program classifications, on the other hand, focused on the different categories of training--basic, advanced individual, and unit--rather than on the organizations that conducted the training. Moreover, unit training was identified specifically in the program budget, while in the appropriations budget its costs were distributed among a number of different programs.

The McNamara Program Budget System of the 1960's

The Army's Program Budget System was revised frequently throughout the 1950's in small-scale efforts to improve the management of operations and maintenance type resources. The number of primary programs was increased to sixteen, and changes were made in the scope of the classifications within many of the programs. The next significant revision, however, occurred in 1960 under former Secretary of Defense Robert S. McNamara. Nine major programs designed to relate costs to military missions were introduced. These programs superseded the sixteen programs the Army had been using and are as follows:

1. Strategic Retaliatory Forces
2. Continental Air and Missile Defense Forces
3. General Purpose Forces
4. Airlift/Sealift Forces
5. Reserve and Guard Forces
6. Research and Development
7. General Support
8. Civil Defense
9. Military Assistance

Figure 1-3. DOD Major Programs.

None of the nine DOD programs related directly to specific budget appropriations such as Military Personnel or Procurement, as had been the case with the Army program system. Each of the nine programs was [illegible] set of program elements which represented particular DOD activities or submissions. A program element is a combination of people, money, materiel, and facilities which together constitute an identifiable capability or activity. For example, the basic identifiable [illegible] and [illegible] program elements in the General Purpose Forces Program, [illegible]

divisions). All of the costs associated with the resources required to equip, operate, and maintain the units of a given program element are aggregated without regard for appropriation classification. Thus, the total costs associated with program elements include costs relating to several appropriations.[17]

Institutional and unit training were treated separately within the DOD program structure. Institutional training was treated within several major subcategories of Program 7, General Support. Unit training costs were not identified as a separate entity, but were submerged as part of the unit operations costs of either the Active Component forces in the General Purpose Forces Program or the Reserve Component Forces carried in the Reserve and Guard Forces Program.

The OSD program budget structure was developed to assist upper management in DOD, the Office of Management and Budget, and the Congress in making budget decisions with some insight into the impact that proposed decisions would have on particular programs or missions. It was intended to offer for administrative review rational choices of objectives and resources. Congress, however, did not accept the program approach as a substitute for the functionally oriented appropriation structure established by P.L. 216. This may have been due to the reluctance of the appropriation committees to abandon their historical basis for forming judgments on the validity of budget requests, or they may have preferred to narrow the scope of detail of the appropriation displays, rather than focus on an appraisal of budget programs keyed to the fundamental purposes of military activity.

> "It is much easier for an Appropriation Committee, for example, to review a budget request of $4.3 billion for pay & allowances for 960,000 active duty Army personnel than, say, a request of $18 or $19 billion for the major program "General Purpose Forces," or even a request of $700 million for the program element "Army Infantry Divisions."[18]

Summary

Through history, the Army has adjusted to meet the expanding management challenges brought on by the Nation's growing national security objectives and the military's technological advancements. Funding for training has evolved from a single-appropriation approach to a fragmented identification of requirements prepared as individual budgets by the technical service chiefs, to an explicit identification by the technical service and combat arms chiefs of the resources required to support the school training for which they were responsible. This evolution continued with the reorganization of the appropriations system in 1949, under which institutional training was consolidated into a single OMA account, although a unique [illegible] classification [illegible] was not established for unit training. The system continued changing through the [illegible]'s as the Army developed [illegible]

program for relating resource inputs to particular missions or activities. This Army program system was then superseded by a DOD program structure whereby institutional training resource requirements were identified as a specific subprogram. Resources for unit training, on the other hand, were obscured within the general O&M funds allocated to units. Finally, as chapter II indicates, the original nine DOD programs evolved into the ten programs presently contained in the Five Year Defense Plan (FYDP).

CHAPTER II

TODAY'S TRAINING COSTS

Chapter II discusses how today's training costs are associated with institutional and unit training. A brief overview identifies where training costs appear within the ten DOD FYDP programs. The activities within the Training Program are discussed to include the support provided to unit training. The methodology for estimating the cost of institutional training is also presented. A discussion of unit training addresses the problem of estimating unit training costs and relating those costs to training readiness. Additionally, attention is given to the question of trade-offs between training conducted in the institution and in units.

DOD FYDP Programs

Basically, the FYDP is a data base consisting of ten major programs that define both mission and support responsibilities. The Army subdivided DOD Programs 3, 7, and 8 into subprograms as a means of enhancing the management of the resources associated with those programs. The original nine DOD programs have been revised and expanded into the ten programs shown in Figure 2-1.

Program 1	-	Strategic Forces
Program 2	-	General Purpose Forces
Program 3	-	Intelligence and Communications
3C	-	Communications
3I	-	Intelligence
3O	-	Other
Program 4	-	Airlift/Sealift
Program 5	-	Guard and Reserve Forces
Program 6	-	Research and Development
Program 7	-	Central Supply and Maintenance
7S	-	Supply
7M	-	Maintenance
Program 8	-	Training, Medical, and Other Personnel Activities
8T	-	Training
8M	-	Medical
8O	-	Other
Program 9	-	Administration and Associated Activities
Program 10	-	Support of Other Nations

Figure 2-1. DOD FYDP Programs

Each program or subprogram is defined in terms of program elements, i.e., people, money, materiel, and facilities. It should be noted that General Purpose Forces, Program 2, includes almost all of the Active Component's combat and support units. All Reserve Component units are carried in Program 5.

Training Resources within the FYDP

It would be easy to assume that training resources are limited to Program 8, Training. However, training resources also may be identified explicitly in Programs 2, 3, 5, 6, 7M, and 8M. The training resources associated with Programs 3, 6, and 7M, however, are not significant when compared to those required for Programs 2, 5, and 8M. The training-related resources in Program 6 support such efforts as exploratory development of training technology and training studies and analyses. Resources in Program 7M would apply, for example, to the new equipment training (NET) program. Programs 6 and 7M generally do not include any institutional type training.

The resources for almost all institutional training are carried in Program 8T which, in a practical sense, has its focus on individual rather than collective skills or tasks. However, there is one significant exception to this. As explained below, the institutional training of personnel in medical skills is included in Program 8M. Additionally, resources for individual training as well as the collective training of personnel in the general purpose forces are accounted for in Program 2. Training resources for Program 2 personnel will be discussed in greater detail later in this chapter.

Medical Training Program 8M

Program 8M is unique. The institutional training of personnel in medical skills has not been consolidated with all other institutional training within the functional Program 8T. Rather, it is considered to be an integral part of the total product or output of the Army's health care mission. Program 8M is a good example of how program budgeting is intended to work. The Army's health care delivery system is a well-defined activity with measurable outputs. Its resource requirements can be related to what is being bought in terms of medical services. Perhaps there are some lessons that can be applied to the challenge of relating training resources to the training requirements of Program 2 forces.

Whether to include medical training in Program 8T or to group it with the medical program under 8M is a moot point. If it were within Program 8T, that program would be more representative of the total output of institutional training. Including medical training within Program 8M, on the other hand, allows that program to account more completely for the Army's medical system.

The rationale for this exception to the accounting of institutional

training is based on the overriding advantages of having resource requirements for installation medical support as a complete package. (This does not apply to TOE medical units.) The institutional training of personnel in medical skills is considered to be an intrinsic module of the total health care delivery system whose components interact powerfully with each other. Medical training resources, therefore, are consolidated so that the impact of any changes in training resources may be traced through the entire system to determine the effect on all other components of the system.

As a result, it can be shown that reductions of resources allocated to the institutional training of medical personnel, which cannot be absorbed through training efficiencies, will result in less qualified medical personnel. The nature of health care makes it obvious that a training base output of less qualified medical personnel would force the Army's medical authorities to make a difficult choice between two possible courses of action. First, the level of health care delivered in the medical facilities could be curtailed commensurate with the attenuated level of training. Second, additional resources could be identified and applied toward the affected activities of the medical facilities to redress the shortfall in the level of training. The second action would allow the level of health care to remain unchanged, although it must be recognized that the dollar value of the applied resources would have the net effect of reducing the savings supposedly realized through the reduction of training base requirements.

The inclusion of institutional medical training within the medical program has the distinct advantage of causing the entire medical system's resource requirements to be reviewed as a total decision package. If medical training were reviewed as part of Program 8T, decisions on medical training could possibly be made without considering the resulting impact on the "delivery" of health care. Additionally, the treatment of medical resource requirements as a total package facilitates tri-Service reviews of proposals for DOD consolidation of various aspects of medical training and health care.[19]

Training Program 8T

Other than medical training, basically all other institutional training of individual skills is included in Program 8T. However, this program is not limited to such training. The institutional training community also has the responsibility and is allocated significant resources for activities other than the conduct of training. These activities are threefold: training developments, combat developments, and direct assistance to unit training.

Training Developments

The training developments activity provides for the development and improvement of training technology and instructional systems. This is accomplished by the introduction and management of improved training

techniques and devices based upon the most current doctrinal and material developments. Training developments involves task analyses which provide products employing instructional systems developments (ISD) to improve the training readiness of the general purpose forces. Resources are also expended for the development of such unit training-enhancing products as: soldier's manuals, skill qualification tests (SQT), Army training and evaluation programs (ARTEP), and integrated technical documentation and training (ITDT) literature. It can be seen that most of the products of training developments are for direct use by Program 2 units.

Combat Developments

The second training base activity is combat developments. This activity supports the development and integration of combat doctrine, organizational concepts, and materiel requirements. Stated in another way, combat developments outputs dictate how the Army's deployable units will b organized, how they will be equipped, and how they will fight. It is apparent that the resources consumed by the training base in its combat developments activities is an expense of having division forces.

Direct Assistance to Unit Training

The direct training assistance to units outside the training base has a significant impact on the conduct of unit training. The scope of the support to unit training is extremely broad and includes the procurement, production, and distribution of training aids and devices, audio-visual materials, and training literature for Army-wide use. The expenses associated with training literature are for printing, reproduction, and binding of publications used for individual and collective unit training. Als included in the cost of assistance to unit training are the expenses associated with the assistance of institutional, mobile training teams (MTT) provided to general purpose forces.

The identification of the products and services of the above three categories of Program 8-T should make it clear that a significant portion of the resources consumed by the training base is for activities other than for the conduct of institutional training. This fact is often overlooked by critics of the Army's training costs.

Individual Training in the Training Base

For the purpose of this discussion, individual training conducted in the training base is limited to: recruit training, general skill training, and integrated recruit and skill training--referred to as one station unit training (OSUT). As noted above, not all individual training is conducted in the training base. Of the 131 critical tasks required of an 11B10 MOS infantryman, for example, only 44 are currently taught in the training base. The remaining 87 critical tasks must be taught to the new infantryman by the receiving unit. This unit must also conduct individual training

to ensure the infantryman maintains proficiency in all 131 tasks. The increased training efficiencies being realized by integrating recruit and initial skill training into OSUT are enabling the training base to increase the number of tasks trained during the infantryman's initial entry training to approximately 75.[20]

Determination of Training Base Requirements

The process for determining which tasks are trained in the training base and which tasks are to be introduced in the unit is based on the following considerations stipulated in TRADOC Regulation 350-100-1: How many soldiers perform the task; is the task essential to the performance of another task; is the task required immediately upon entering the unit; how frequently is the task performed; and is the task critical to the mission?

The above criteria are lacking in that cost is not explicitaly included. The following is an example of one way in which costs could influence the decision maker.

The task being considered is operation of the night vision goggles (AN/PVS-5). The cost of the goggles is approximately $9,000. A large quantity of the goggles would be required by the training base to enable adequate hands-on training. An Infantry battalion's TOE includes a high density of the AN/PVS-5's. This information should, from a cost standpoint, cause the decison maker to favor the alternative to introduce this task in the Infantry unit rather than in the training base. The Infantry battalion is required to have the goggles regardless of whether the training base conducts the training. Therefore, the cost of procuring the goggles for units is not affected by the decision on where to conduct the AN/PVS-5 training. The training base, on the other hand, would be able to realize a significant cost avoidance.

Cost of Institutional Training

Within the training base, there is a formalized procedure for calculating the cost of training: estimates are made on a cost per graduate of established courses of instruction. These costs are categorized in the format shown in Figure 2-2. Understanding the elements included in the cost estimate of institutional training is necessary to make meaningful comparisons with the costs associated with unit training.

Direct Costs

Mission Costs
Program 8T TOE Unit Support
Ammunition
Equipment Depreciation
Student Pay & Allowances
Travel Pay To Course
Per Diem At Course
Total Direct Costs

Indirect Costs

Base Operations
Support Costs
Total Indirect Costs

Total Direct & Indirect

Fixed & Variable Costs

Total Direct & Indirect
Fixed
Variable

Figure 2-2. Cost Per Graduate of Institutional Individual Training

Direct Costs

As shown, the total cost per graduate includes both direct and indirect costs. Direct costs are those which are incurred because of, and are directly traceable to, the training conducted.

Mission costs include the pay and allowances of instructors and supporting staffs, their consumable supplies and equipment, and contractual services. This category also includes the institutional overhead costs (e.g., Commandant/Commander, Office of the Secretary, Director of Industrial Operations, training/school brigades).

The operation and maintenance, military pay, and procurement costs of Program 8T TOE units are allocated to the cost of the instruction supported by those units using a student man-day-of-support basis. The procurement costs relate to the investment cost of the equipment of the TOE units amortized over a 10-year period.

The ammunition cost is the graduate's pro rata share of the total cost of ammunition expended in support of the course.

The cost of major items of equipment associated with the training,

which is procured with procurement funds, is amortized over a 10-year period and is allocated among the personnel receiving the training.

The pay and allowances that the student accrues while in training is included in the cost estimate.

Student travel pay is computed on the basis of cost per one-way mileage.

The student's per diem entitlements while enrolled in the course are assigned against the cost of the instruction.

These elements constitute all of the direct costs. They are divided into fixed and variable segments as explained later.

Indirect costs

Indirect costs are those which are considered to be not directly related to training being conducted at the training installation.

The indirect costs charged to the institution consist of a pro rata share of base operations, installation medical support, family housing management, base communications, second-destination transportation, and Program 2 TOE unit support of training. These costs are generally distributed on the basis of man-weeks/man-years. The base operations cost includes military pay associated with its different accounts. The operations and maintenance, military pay, and TOE equipment depreciation costs of Program 2 TOE units are distributed on the basis of man-days of support by the unit. A 10-year amortization period is assumed for the Program 2 TOE equipment, as it was for the Program 8T TOE unit support discussed above.

Fixed and Variable Costs

The cost data is further refined by identifying the fixed and variable portions of the total cost. Variable costs are extremely helpful in estimating the total change in costs that can be expected as a result of changes in the training load. The computed variable cost is valid only over a given range of training load. For excursions outside the given range, the computed variable costs become invalid, thus necessitating the computation of new ones. The fixed portion of the cost of training is not affected by changes of training load within a given range. For example, if the training load were reduced yet remained within the given range, the fixed cost associated with the eliminated training would be redistributed to the remaining training. The savings in training resources realized by such a training load change, therefore, would be limited to those associated with variable costs.

The assignment of fixed and variable costs of institutional training is accomplished in the following manner: Program 8T TOE unit support and equipment depreciation are considered to be 100% fixed, while ammunition, student

pay and allowances, travel pay, and per diem are considered to be 100% variable. Mission, base operations, and support include both fixed and variable costs. The fixed costs for these three categories are derived independently through the use of a two-variable linear regression model which uses the training work load (10-year data base) as the independent variable and costs as the dependent variable. Having determined the fixed cost, the variable cost is computed as the difference between the total cost for the category and its fixed cost.[21]

Refinements of Institutional Cost Methodology

OSD accepts the above methodology of costing institutional training as a valid measure of efficiency, acknowledging that some changes are necessary. The Services are working with OSD to develop an OSD-wide costing methodology which will provide more complete and consistent course-costing data.[22] The cost elements just discussed are expected to remain the same; however, it is anticipated that some refinements will be made to procedures for applying costs to those elements.

One refinement could well be in the application of the cost of training support provided by Program 8T and Program 2 TOE units. As noted earlier, the cost of the TOE unit support is based upon the number of man-days rather than type of support provided. This criterion causes equal costs to be attributed to the following two diverse training support scenarios. In the first case, one company of tanks is made available in the unit's motor pool to support a 1-day class on turret familiarization. The second situation involves one company of tanks committed to support 1 day of driver's training. It is obvious that the operations and maintenance cost of the training support rendered in the second situation is much greater than the costs associated with the training support in the first situation. Training support costs of TOE units, therefore, should be based upon a combination of man-days and "activity" of support rather than just man-days.

A second consideration for refinement addresses a distinction which should be made between the cost of support provided by Program 8T TOE units vice Program 2 TOE units. The total cost of ownership, to include pay and procurement cost of equipment, of Program 2 units should not be charged to the cost of institutional training support as is validly done for Program 8T unit support. The program 8T units are in the Army's force structure for the sole purpose of supporting institutional training in order that Program 2 units are distracted from their combat readiness missions. Thus, all the costs associated with having Program 8T units in the structure are an expense of the institutional training which those units support.

The Program 2 units, on the other hand, are in the structure to meet JCS strategic planning requirements and are required regardless of whether or not they support institutional training. Therefore, the dollar cost associated with Program 2 unit support should be limited generally to the cost of the materials and supplies consumed by the unit in support of

institutional training. Spare parts, POL, and ammunition are examples of such consumables. It can be seen that from a pure dollar standpoint the use of the Program 2 units is a definite training efficiency.

It would be shortsighted, however, to consider only the reduced dollar cost of employing Program 2 units to support institutional training. The more significant cost is the time diverted from the Program 2 units' own training requirements. The time diverted to training base support may deprive the Program 2 unit to the extent that sufficient time does not remain available for it to maintain its own proficiency at the requisite level. The dollar savings achieved by replacing Program 8T unit support with support from Program 2 units frequently may not be justified by the degradation of the training readiness of the Program 2 unit.

A third refinement of the methodology of estimating institutional training costs involves the inclusion of the cost of training the training base instructors. These costs are not currently included in the cost of institutional training. The trainers themselves receive initial entry and advanced skill training, incurring a cost which would not be necessary if there were no requirement for the trainers. It appears, therefore, that the cost of of training the training base personnel should be included in the cost-per-graduate computations.

Cost of Training in Force Units

Although reasonable estimates of the cost of institutional training are available, the cost of unit training resource requirements is virtually unknown. This information gap frustrates efforts to investigate the trade-offs between institutional and unit training, as well as attempts to justify resources for unit training. Three significant challenges, discussed below, must be met in order to alleviate this costing dilemma.

OMA Program 2 Mission Funds

The first challenge is to identify that portion of OMA Program 2 Mission funds which support training. Program 2 units are provided funds for operation and maintenance and procurement of necessary equipment and supplies. Mission costs are those incurred for items, related directly to mission performance, which are recorded on organizational property records, and which would normally be deployed with the unit. Training is one of many activities related to a unit's mission performance, and therefore is supported by a portion of the unit's Program 2 Mission funds. This cost is generally accepted as being limited to that particular portion of Program 2 Mission expenditures. This point will be addressed in greater detail later in this chapter.

The major expenses associated with unit training include, but are not limited to, the costs of petroleum products and spare parts for the unit's

vehicles and equipment. A significant portion of a unit's mission funds would be consumed for these purposes even if the unit never left the garrison for field training. Nontraining costs are incurred by TOE equipment changes or modifications, installation details, mission support to Reserve Components/ROTC, demonstrations, customary administration and housekeeping, and routine maintenance.

Although existing accounting procedures can identify the total cost of a unit's consumables for a given period of time, standardized procedures do not exist to assign equitably the costs incurred by specific activities conducted during that period. The notion that the cost of training includes the cost of only those spare parts actually replaced during training, or even during some given period of time following the training, would seriously misrepresent the cost of training. A vehicle part could fail during a routine administration run in garrison, for example, having experienced 90 percent of the wear during training events. If representative cost estimates are to be made, a pro rata share of the cost of that part should be made to training activities and garrison operations commensurate with the percentage of wear. The Army, however, does not exploit fully the capability to prorate the costs of consumables based upon usage factors. This limitation precludes the identification of mission costs to be attributed to training or to activities other than training.

Funding guidance to a unit will frequently include a specific funding level to conduct unit training; however, without exception, the funds identified are for a particular training activity which is not normally a recurring action. A given dollar portion of the total mission account may be identified, for example, for a unit to participate during the fiscal year in a desert training program. However, the total costs for "all training" conducted by the unit is still not estimated reliably.

Other Unit Training Costs

The second challenge is to dispel the common belief that the cost of unit training is appropriately limited to a portion of mission funds. However, even if those funds could be estimated reasonably well, the estimate would not present a valid picture of unit training costs. The Army has grown accustomed to regarding only the funds that the unit commander has the responsibility to manage (i.e., Program 2 Mission) as being sensitive to the training requirements of his unit. The commander's requirements for training funds have come to be regarded as the only funds sensitive to the intensity of his training program. For example, the funds for training ammunition or Redeye MTS expenses are not normally addressed when quantification of unit training resource requirements are discussed. It is therefore necessary that all the resources sensitive to unit training be identified. A methodology for accomplishing this action is proposed in chapter V.

Determination of Training Requirements

Assuming that the cost of institutional and unit training could be estimated to the satisfaction of all, there remains a third challenge. This involves the problem of determining the type and frequency of training needed to be conducted to allow the Army to sustain the requisite level of proficiency. Under the above assumption, cost comparisons could be made between any conceivable mix of institutional and unit training, and costs of an unlimited number of unit training program alternatives could be estimated. None of this is sufficient without answering the major question: Which institutional/unit training mix and which unit training program alternatives provide the necessary training proficiency to meet the Army's mission requirements? It is the effectiveness of training and not its efficiency that affects training readiness. Given the cost of a particular training event or set of events, one must also be able to relate that cost specifically to its effectiveness. Not knowing what training needs to be conducted or the necessary frequency of retraining of particular tasks causes analyses of training resource requirements to be exceedingly difficult.

Efficiency vs Effectiveness

Training managers frequently attempt to express the cost of training readiness without being able to define the particular training required to achieve that readiness. It is essential, however, that both training efficiency and training effectiveness be considered in any analysis of training readiness resource requirements.

"Efficiency" describes the relationship between the cost and output of training, while "effectiveness" depicts the relationship between the particular product of training (i.e., a trainee with given proficiencies in given skills or tasks) and the valid requirement for that specific product. If there were identifiable inefficiencies in the initial entry training program, they could be eliminated without changing the effectiveness of the training product. The efficiency of the training, on the other hand, would be increased, as was the case with the combining of recruit and initial skill training into one station unit training (OSUT). (It is acknowledged that OSUT also increased the effectiveness of the training by virtue of the improved quality of the graduate.)

If the training activity is already operating at or near optimum efficiency, however, a reduction in resources can be made only by lowering the effectiveness of training and accepting some degradation in the quality of the product, i.e., the trained soldier. The notion that such a reduction represents a pure saving is erroneous if not actually dangerous. The training system is not closed with respect to its outputs because trainees move from the training base system to the Program 2 unit system. A "full" account must be taken in terms of both costs and effectiveness. If additional Program 2 Mission funds are required by a unit to overcome a

training quality shortfall in order to maintain a given readiness standard, then there must be a corresponding decrease in the training base resource savings. The end result may be in fact a net increase rather than decrease in the Army's total resource requirements. Moreover, additional unit training requirements will consume time. If this additional time is not provided to the unit, even unlimited dollars will not allow the unit to sustain its training readiness.

On the other hand, if no need for additional Program 2 Mission funds is identified, the training base savings become actual dollar savings--notwithstanding the degradation in unit training readiness. The challenge is not so much one of estimating the dollar cost to the unit as it is of determining the training required to make up for the training shortfall of its new personnel and/or the resulting degradation of unit readiness. Determining the impact on force readiness, a subjective undertaking at best, is most effectively left to the experts. The question is, Who is the expert--the military department proposing the budget or the civilian authorities reviewing the proposal? It is difficult to detect genuine economies when the training resource requirements equation lacks quantification of effectiveness.

Summary

The challenge of determining the cost of training is anything but new. It is interesting to note that we are facing basically just that obstruction the Congress attempted to overcome through Public Law 216 and which the DOD FYDP programs attempted to eliminate. The Army is tied to a system of identifying cost elements for training with little regard for their ultimate impact on training readiness. The task remains, therefore, to develop a system which emphasizes training costs in terms of output rather than input.

CHAPTER III

COMPARABILITY OF RESOURCE VALUE

Any analysis of training resource requirements must be sensitive to the comparable value of people, dollars, and time which exist at each level of command. Strong interactions exist among these three resource categories. Changes in the level of one of the resources frequently will have a significant impact on the levels of the other two resources. This phenomenon is often difficult to portray, since the perspective of the relative value of people, dollars, and time in conducting training is considerably different at the platoon leader level than it is at the Pentagon level of management.

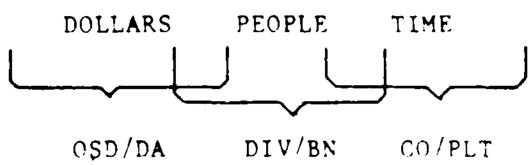

Figure 3-1. Comparability of Resource Value

OSD/DA Level

At the OSD/DA level, although the degree of attention paid to the different resource categories varies, dollar resources are perennially a primary concern. For the most part, the Army end strength is accepted as a given. However, to the extent that the people resources impact on dollar resources, senior officials give increasing attention to such issues as possible training responsibility alternatives with respect to the training base. Escalating manpower costs and volunteer accessions will further stimulate this attention. Whether the time resource element is taken into serious, upper management consideration in evaluating training program decisions is generally dependent upon the degree to which time impacts on dollar resources, as in the case of training base course lengths. Time for unit training on the other hand, is infrequently--if ever--addressed, since OSD/DA either do not consider time for unit training to be a "scarce" resource, or they are unable to pinpoint their ability to influence its allocation. The significance of this point will be addressed later.

Division/Battalion Level

At the division to battalion levels of training management, the relative perception of training resources changes considerably. The amount of influence this level of management has over dollar resources is considerably less than what exists at the OSD or DA level. Recognizing this constraint, divisions/battalions focus their attention on the two remaining resource categories--people and time.

Divisions/battalions have considerable latitude in controlling the personnel resources within their commands. Within the manpower available, divisions/battalions can maximize the contribution personnel resources can make to a unit training program by maintaining among their different units a uniform level of personnel in quantity, quality, and grade. Unit shortfalls in one area, such as grade, may be compensated for by the quality of the unit personnel. Other personnel management measures address themselves to such problems as turbulence and MOS mismatch.

Consideration of time resources at this level generally consists of time allocations among the units for the purpose of executing the general training plan. Some of this allocation is made in conjunction with the availability of particular facilities such as ranges or maneuver areas. At this level, however, the importance of time as a resource is subordinate to the people resource because of their overwhelming impact on a unit's training program.

Company/Platoon Level

The value placed upon people, dollars, and time resources at the company/platoon level is not consistent with the perspective at either OSD/DA or division/battalion levels. At this third level of training execution, companies and platoons value time as their most critical resource.[23]

The interaction of people/time resources carries a special significance for company/platoon training efforts. If personnel turbulence increases within a company, the frequency of retraining necessary to sustain proficiency will have to be increased. The unit has two possible alternatives if additional training time is not made available. One is to eliminate training for some tasks to allow increased frequency of retraining on the remaining tasks. A second alternative is to continue to train all the tasks without increasing the frequency of the training. Neither alternative allows the company to sustain its training proficiency at the preturbulence level. Thus, an additional allocation of training time is needed in order to maintain a constant level of proficiency.

This interdependence of people and time resources also extends to dollars. If personnel resources are degraded, training time requirements may have to increase, which means more dollar resources must be allocated to conduct the additional training. Increased dollar resources, however, must

be accompanied by increased training time. It may be that the unit's base support and other nontraining requirements would have to be reduced in order to allow the unit to devote more time to training. Without it, the utility of any increase in training dollars would be minimal. To gain full value from scarce resources, the Army must proportion its allocation of resources so that each complements the other two.

It should also be recognized that improvements in the personnel resources provided a unit can, and should, be translated into training dollar savings if the unit gains, then exceeds, its required training proficiency. Nevertheless, the dominant resource available to be allocated at the company/platoon level is time.

Impact on Decision Making

In determining the optimum amount of resources, decision makers should not only consider the interplay between people, money and time, but also how their resource decisions will impact on each level of training management. They should know the different resource costs at varying management levels (DA, Div, Co) and their relative importance to effectiveness and efficiency. It follows that dollar costs should not be the sole determinant for decisions made at the DA level. Such decisions must also reflect the impact they may have on such areas as the training time resource available at company/platoon level.

There are tradeoffs in any decision-making process. Assume that a cost analysis were to document that it is less expensive (in dollars) to train a particular MOS in units vice the training base. Rather than limit his consideration of the matter to the mere difference in dollar costs, the decision maker should also evaluate the impact his decision will have on unit training time. The conduct of the MOS training in units may impinge upon the unit's training time to the extent that all the collective training required to maintain the unit's prescribed level of training readiness cannot be accommodated.

Thus, an analysis of the mix of training base and unit training requirements must address the effect on a unit's training time which in turn may have an effect upon the training readiness of the unit. Although in some cases there may be a net dollar savings by transferring training from the training base to units in the field, the overall result could be an associated degradation of unit training readiness which outweighs the dollar savings. While the net increase of dollars for training the MOS in the training base pays for that training, the more significant fact is the unit training time, and in turn unit readiness, that is being bought.

Procurement Decisions

The comparability of resource values must also be considered when making hardware procurement decisions. What may be a wise procurement

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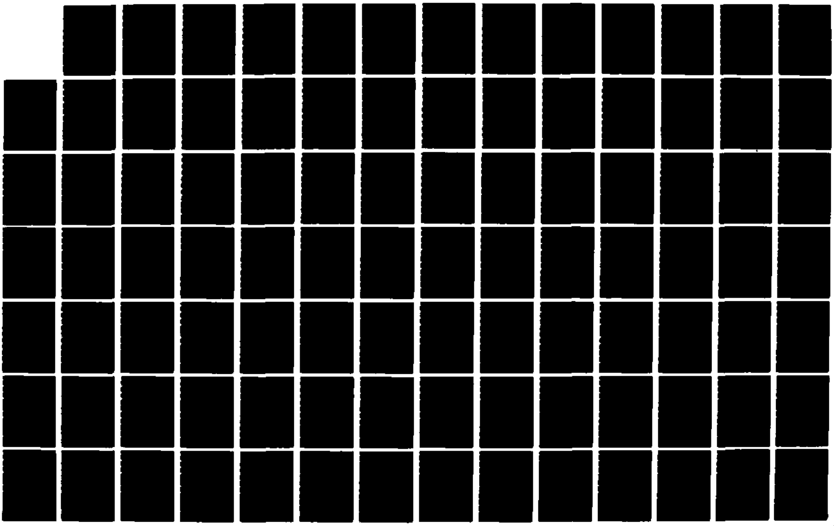

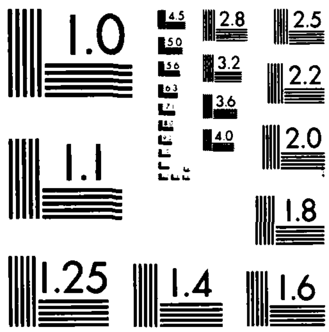

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decision based upon the results of a cost and operational effectiveness analysis (COEA) may be a poor decision from the standpoint of a unit's training time resource. The COEA assumes that the users of the hardware system are trained to the extent necessary to achieve the full effectiveness of the design characteristics of the system. Should the system's complexity require more time to train to full proficiency than is available at the company or battery level, user proficiency will fall short of COEA assumptions. As a result, the system's effectiveness--as determined in the COEA to justify a "dollar-wise" procurement decision--will not be present, and dollar resources will have been misallocated.

Other Training

Although the above discussion of the comparability of resource value addresses resources in terms of people, dollars, and time, other resources such as facilities and equipment are also essential. However, for the purpose of expressing the relationship of the value of resources at various echelons of training management, dollars were considered a common denominator which included these resources. Further, the ability of the different echelons of management to affect the availability of these two resource categories is about the same as it is for dollars. A division/ battalion, for example, has some latitude in allocating to its subordinate units different maneuver areas within the total training area provided since decisions to enlarge a division's training area are generally limited to OSD/DA. This echelon of managment, however, has only a limited ability to affect the overall quantity of this resource that has been made available to it. At the company/ platoon level, there is little or no influence over training area availability. Just as was the case with dollars, the company/platoon is restricted to conducting its training within the resource constrictions imposed by higher headquarters.

Decision makers, therefore, should both understand the comparability of resource values and be aware of the relative importance of the different training resources at various levels of training management. Only then can resources be effectively related to training readiness.

CHAPTER IV

THE LINK OF RESOURCES TO READINESS

This chapter addresses the basic resource question: What is being bought with the training dollar? Relating different levels of training resources to appropriate levels of training readiness provides the answer.

Relationship of Resources to Readiness

Determining with any degree of accuracy what training dollars buy requires a basic understanding of the relationship between training resources and training readiness. As resources are added or subtracted, there should be a corresponding increase or decrease in the level of readiness provided. However, this presupposes a capability to differentiate between various levels of readiness. If generally there is only one primary level of readiness, for example, C-1, it is difficult to substantiate the relationship between increased resources and a higher level of combat readiness.

Existing C ratings in the Army readiness reporting system fail to communicate that different levels of training readiness exist among units reporting C-1 in training, and that those differences may be attributed to differences in resource allocations.[24] By claiming a C-1 readiness level, the Army presents a misleading case for training resources since the assumption can be made that that level cannot be improved upon and, therefore, additional training resources cannot be justified. Such a conclusion is understandable if there is insufficiently precise distinction made between degrees of combat readiness.

Greater Resolution of Readiness Levels

Greater distinction could be made between levels of training readiness. The military's enhanced strategic mobility has led to the development of finely tuned plans which schedule unit deployments based on time-days. Thus, a more precise relationship could exist between a unit's readiness requirements and the number of days available between its alert warning and its overseas deployment. This time-readiness relationship could allow training readiness levels to be more sensitive to variations in resource inputs than is currently the case.

If this increased sensitivity could be demonstrated, the Army could present a stronger case in justifying training resources. The varying return on the different levels of investment in training dollars could be expressed in terms of how changes in the training backlog affect the attainment of a combat-ready status. Furthermore, if a combat-ready unit is defined as one whose level of training proficiency enables it to fight and win with virtually no additional training between warning and enemy engagement, there would be a greatly reduced opportunity for misunderstanding levels of readiness. The baseline-goal would be unequivocal. All other levels of training readiness could be expressed in terms of the number of training days required for a unit to attain the training proficiency associated with the goal of combat-ready status.

Training Readiness Objectives

It may not be necessary to provide all units with resources sufficient to maintain a combat-ready status. A unit in CONUS with a mission to deploy to Europe at D+30 may not be required to maintain the same level of training readiness as does a USAREUR unit. The CONUS unit may have some training time available within its deployment schedule to train-up, and therefore could sustain a reduced peacetime level of readiness commensurate with its ability to achieve a combat-ready status prior to deployment. Less demanding training readiness objectives could be associated with lower levels of sustaining readiness for Active and Reserve Component units, based on the number of days expected to be available to a unit for train-up. The upper limit of such days could be set by the unit's position on the Time-Phased Force Deployment List. However, that limit should take account of the amount of time consumed by personnel and administrative actions as well as by packing, loading, and transport requirements. Actual time available for unit train-up would therefore normally be less than the period between its warning and its deployment overseas. Train-up time may also be decreased by insufficient postmobilization training facilities and shortages of essential training equipment. In the case of the Reserve Components, the time required for the units to assemble at their mobilization stations must also be considered in the determination of train-up time availability.

In this manner, the level of sustainment training is determined. Thus, a unit with virtually no train-up time available, such as those in USAREUR, would have to sustain a virtually absolute combat-ready level of readiness, while a unit with available train-up time could maintain corresponding lower readiness levels. The justification of training resources could then be based upon the projected cost of sustainment training.

Training Requirements to Meet Readiness Objectives

The cost projection for the sustainment training of an average battalion of a given type reflects the type of training determined to be essential to

its particular sustainment level. The combat-ready status for an average unit implies the ability to execute individual and collective critical tasks at a given level of proficiency. These critical tasks, specified in the soldier's manual and ARTEP, can range from an individual's reaction to indirect fire to the execution of unit fire and maneuver techniques. Once the critical tasks are identified for a particular unit's missions, they can be systematically clustered into training drills and battle drills.[25] The clustering process would produce multiechelon drills and take maximum advantage of the integration of individual and collective tasks. Additionally, the training drills and battle drills can be aggregated into the missions specified in the unit's ARTEP.

The frequencies with which the various training drills, battle drills, and ARTEP missions must be repeated (retrained) in order for average units of a given type to sustain different levels of training readiness are influenced by three personnel characteristics: turbulence, NCO fill level, and not-present-for-training strength. The personnel parameters used in the first generation Battalion Training Model to make time and frequency adjustments to training requirements are: quarterly turbulence of unit personnel of 10%, 20%, and 35%; level of officer/NCO fill of 85%, 75%, and 60%; and not present for training percentages of 15%, 25%, and 60%. Identification of these specific training requirements can then form a partial basis for comprehensive unit training guidance.

Unit Training Guidance

If the training tasks and frequencies are established as discussed above, the training requirements of an average battalion of a given type could be expressed in terms of frequencies of repetition of various training drills, battle drills, and ARTEP missions. The mixes of frequencies and training tasks, which would be dependent upon different combinations of readiness levels and personnel characteristics, could serve as overall unit training guidance. This guidance could also include other training requirements not presently included in the ARTEP, such as combined arms live fire exercises (CALFEX); early deployment readiness exercises (EDRE); ammunition up-load exercises; and civil disturbance drills. The unit training guidance could be used to justify sustainment training requirements and associated resources to DA/OSD.

Unit training guidance should be considered by unit commanders as descriptive rather than prescriptive, since all training tasks are not equally important to all like units. Differences in training circumstances, unit missions, commanders, and unit personnel require varying combinations of tasks to maintain required readiness. These differences, alone or in combination, would suggest which portions of the training guidance should apply to any particular unit. Each commander would retain the responsibility for estimating his training requirements.

The training drills, battle drills, ARTEP missions, non-ARTEP missions,

and associated frequencies recommended by the unit training guidance may be aggregated and categorized for scheduling and costing purposes by type training days as, for example, CPX, ARTEP, FTX, range, and so forth. To facilitate training management by HQDA, these specific categories should be consistent among MACOMs. Establishing categories of type training days is instrumental to the methodology, outlined in chapter V, for justifying the resources projected for the training recommended in the unit training guidance. For a more detailed discussion of grouping the drills and missions into different type training days, see the Battalion Training Model description in the ARTS summary.

The formulation of an average battalion's training requirements in terms of type training days could be tied to a training readiness reporting system. The system could then communicate the sustainment level of training being maintained by a unit, as well as how the sustainment level being reported compared to its readiness objective. The key factor is that utilization of the unit training guidance provides a common denominator for justifying resources without precluding individualization among units.

Readiness Ratings

The sustainment training objectives assigned to a unit would be an expression of how close to being combat ready that unit was expected to be. Such an expression could be based on the number of train-up days required for the average battalion to move from its assigned sustainment readiness level to a combat-ready status. A sustainment level should not be assigned to a unit which would require more train-up days than were programmed. Thus, a battalion which was programmed for 10 days train-up, would normally be assigned a battalion sustainment training readiness objective level of Bn-10. An enhanced readiness posture could be achieved, however, by assigning a higher sustainment level, as expressed by Bn-5.

Whether a unit was provided the level of resources associated with its assigned readiness objective and justified by the unit training guidance could be indicated by the traditional classifications of green, yellow, and red. A unit could be green if its training proficiency allows it to reach a combat-ready status within the number of days allowed for train-up. A Bn-12 CONUS battalion, for example, could be rated green if its training proficiency could reach the combat-ready level within a 12-day train-up period. Confirmation of a unit's readiness could be verified by random diagnostic checks of actual proficiency in the applicable tasks under specified conditions and standards. A yellow or red rating could indicate that the unit's proficiency was too low for it to reach combat-ready level within the number of days programmed for its train-up. Yellow and red ratings could distinguish the degrees of readiness shortfall. For example, yellow could identify substandard sustainment training requiring less than or equal to 33% more train-up days than specified by the readiness level assigned to the unit. Red could indicate deficiencies greater than 33%. Thus, a Bn-15 battalion could be rated yellow if its training proficiency necessitated a 16 to 20-day train-up period, while that same unit could be

rated red if it required 21 or more days of train-up to a combat-ready status.

The implications associated with the 33% figure are consequential. The loss of combat potential or delay of deployment of a yellow/red unit becomes more severe the greater its actual required train-up time exceeds its programmed train-up time. Therefore, the percent figure selected to separate yellow and red ratings should reflect thresholds of the degrees of severity. In order for the percent figure to have an acceptable degree of usefulness, it must not allow inappropriate "quick fix" remedies for reducing the number of red units, i.e., unsupported lowering of the established percent figure to upgrade artificially the readiness level. For example, if ten Bn-15 tank battalions were provided resources which allowed them to sustain only the readiness associated with a 21-day train-up, the battalions would be reported red according to the hypothetical 33% figure. By arbitrarily adjusting that figure to 40%, the ten red battalions could be rated yellow at no dollar cost; however, their degraded effectiveness would remain unchanged.

A yellow or red unit could not be expected to attain combat ready proficiency during its programmed train-up period. If no additional resources were applied to elevate such a unit to its prescribed level, two courses of action would remain available. The unit could deploy as scheduled, but with less than its full combat potential, or it could delay deployment long enough to achieve a combat-ready status. Neither of these alternatives is attractive, however, since both would jeopardize the successful accomplishment of the Army's combat mission.

Resource Justification

Justification of resources for unit training could be most effective if related directly to the unit's assigned readiness levels. A rapid deployment readiness level would identify a unit with a short train-up period; therefore, greater resources would be required for its annual sustainment training than for a similar type unit assigned a lower readiness level. The unit with the lower readiness level would be programmed for a longer train-up period, and thus should not have the need to sustain the same degree of training proficiency as a unit with a shorter train-up period.

Through this concept, a price could be projected for an average unit's training requirements based on the combination of training drills, battle drills, and missions and associated frequencies of repetition required for a stated level of readiness. As a result, resources would be tied directly to the level of training proficiency. By being able to cost different readiness levels associated with the training recommended in the unit training guidance, the Army will be able to communicate to OSD and the Congress not only what training it "is able to buy" with the available resources, but also the resources required for the training it "should buy" to meet its mission requirements. What is bought with the training dollar would be expressed

in the context of the training readiness rating of the units. Just as important, proposed resource cuts or enhancements could be interpreted directly into tangible changes in levels of training readiness.

It is apparent that unit training guidance lends itself to making transformations, in both directions, between training resources and training readiness. Given a resource constraint, the dependent number of type training days (which express the mix and frequencies of repetitions of battle drills, training drills and ARTEP missions that could be bought) could be derived. If the number of type days provided is less than that required for the unit to conduct its established sustainment training, train-up requirements are exceeded, resulting in a yellow or red readiness rating. Reversing that methodology, a desired state of training readiness could be translated into resource requirements, i.e., an average battalion of a given type would normally require a specific number of different types training days to achieve a stated level of readiness. By projecting an average cost for each type day, the total cost estimate could be developed.

Training Area and Equipment Availability

Any discussion of the link of resources to readiness must address both adequacy of training areas and training with reduced levels of equipment. The former issue has been a problem for some time, while the latter is a relatively new challenge that the Army has had to face. Both issues, however, are essentially relatively simple scheduling problems, assuming two critical factors are known: what resources are available (i.e., training areas and specific items of equipment) and what specific training must be conducted.

The first factor, availability of training areas and quantities and types of equipment, is known. Fortunately, the unit training guidance will identify the quantity and type of training that needs to be scheduled for the average battalion. The problem in the past has been that that which needed to be scheduled was undefined. Thus, it could not be determined if available resources were adequate to meet the demands.

Just as it is recognized that units can be scheduled to use common training areas, it may be theoretically feasible for units to be scheduled to use common sets of equipment. The average requirements of the training guidance provide the information necessary for a quantitative analysis of these two critical issues. If the availability of either resource, or a combination of both (i.e., training area and equipment) is not sufficient to conduct the training recommended in the unit training guidance, readiness levels can be expected to decline. The end result (reduced training readiness level) is the same regardless of whether it was caused by a lack of funding for consumables (POL/spare parts), major items of equipment, or unavailability of land. The end result remains that while the lower funding is paying for fewer resources, what is being bought is a lower state of training readiness.

It should be recognized, however, that an analysis of training with reduced levels of equipment extends beyond the effect on readiness. The cost implications of this course of action should also be addressed. For example, training with fewer sets of equipment implies the use of equipment pools, the cost of which would need to be identified. The costs could include those related to the augmentation personnel required to operate the equipment pools as well as any increased maintenance costs caused by the absence of responsibility/pride of ownership of the equipment in the pools. Furthermore, the lowering of standards resulting from equipment sharing could have a corrosive effect on individual and unit discipline manifested in reduced training efficiency and effectiveness.

Battalion Field Training Days

The concept of expressing training requirements in terms of type training days is consistent with the Department of the Army's effort in developing procedures for reporting training requirements in terms of battalion field training days (BFTD). A BFTD is defined as 8-24 hours of mission-related training conducted by a battalion with sufficient personnel and equipment to accomplish its training tasks outside its assigned billeting, administrative, and logistical areas. For example, a battalion field training period of 10 hours would be reported as one BFTD. Company and platoon field training could be reported proportionally. In a battalion of five companies with four platoons each, a company field training day would be reported as 1/5 BFTD, and a platoon field training day would equal 1/20 BFTD. The training requirements would be reported in an aggregate number of BFTD's by type battalion (e.g., Armor, Mechanized Infantry, Field Artillery).[25]

The BFTD represents a major step forward in the expression of training requirements. However, greater precision is required to enable more rigorous justifications of resources required for the various levels of training readiness. The basic definition of BFTD, however, should be expanded to accommodate the categorization of training by type day. A need exists to have ARTEP, FTX, CPX, and range-BFTDs. Additionally, the BFTD currently does not include any "in garrison" training. Although such training is frequently of little or no dollar cost, it is a heavy consumer of time and as such needs to be accounted for. Thus, a formulation such as a garrison training day (GTD) could be introduced for reporting training requirements.

Summary

The need clearly exists to express levels of training readiness with greater resolution. This can be accomplished by relating readiness level objectives to the amount of time between alert warning and deployment that a unit has available for train-up. The greater the train-up period, the lower the level of sustainment training and training readiness a unit should need to maintain.

Individual and collective tasks could be clustered into training skills, battle drills, and ARTEP missions which in turn may be aggregated and segregated into type training days for scheduling and costing purposes. The frequency of repetition of the training required for an average battalion to achieve various levels of readiness could be derived. These training requirements could be adjusted for certain personnel resource characteristics and be the source of unit training guidance. The unit training guidance could also include other training requirements not presently contained in the ARTEP.

The unit training guidance would serve as justification for training resources required for units to achieve their assigned readiness level. If a unit were not provided the level of resources as justified by the unit training guidance--necessary for the average unit of that type to sustain its assigned readiness objective--the fact could be reflected by a yellow or red training readiness rating. It should be noted that mere performance of the training recommended in the guidance will not guarantee proficiency. It remains the responsibility of the commander to ensure the training meets criterion-referenced standards required to execute successfully his assigned missions.

CHAPTER V

RESOURCE COST OF UNIT TRAINING

In this chapter a methodology for estimating the resource cost of unit training will be offered. The points have already been made that a need exists for a clearer definition of training readiness levels and that changes in the levels of training readiness must be sensitive to changes in the resources allocated to unit training. However, in order for a correlation to be made between training resources and readiness, the cost of training in the units must first be determined.

Such a cost analysis methodology must withstand two tests to be effective. One, it must yield a maximum utility for the resources it consumes, and two, it must be manageable for the unit commander in the field. Some measurements of training resources, for example, which may be desirable from a training management viewpoint, may not be acceptable when the difficulties of data collection and analysis are considered, or when the record-keeping demands on unit commanders in the field become unwieldy.

Total Costs

A full accounting of the cost of unit training requires expanding the costs beyond those associated solely with a unit's OMA Program 2 Mission budget. As discussed in chapter II, a unit's mission account includes only a portion of the actual cost of training conducted by a unit; costs such as would be incurred for training ammunition, for example, would be excluded. If all the costs sensitive to unit training are not considered, planning estimates of training resource requirements will be inaccurate, and a total cost analysis of training alternatives will not be possible. The impact of such excluded costs can be significant: a typical Mechanized Infantry battalion annually expends more than one quarter million dollars in training ammunition alone.

The problems which incomplete cost estimates can create are obvious. First, the appearance of unprogrammed costs during the execution of a planned training program can cause it to be curtailed or resources to be diverted from other programs to make up for the shortfall. Neither alternative is attractive. Both can result in an overall degradation of unit training readiness.

The second effect of not clustering all costs has equally serious

implications. Analyses of training alternatives which do not reflect all the costs involved can result in erroneous conclusions as to the preferability of one alternative over another. For example, consider an analysis of two different tank gunnery programs executed by two tank battalions, with the assumption that the significant difference between the two programs is that battalion A relied heavily on subcaliber devices while battalion B depended upon service ammunition. If the relative costs of the two ammunitions are not included, an incorrect conclusion can be drawn, as the following hypothesis demonstrates.

	Time	Avg Score	Cost w/o Ammo	Cost w/ Ammo
Bn A	4 weeks	95	$90	$120
Bn B	4 weeks	95	$60	$300

Analysis excluding the cost of ammunition indicates that the battalion B program would be preferable to the battalion A program. When the cost of the ammunition is included in the cost of the gunnery training, however, the order of the preference of the two programs is reversed. The selection of an alternative based upon incomplete cost data, therefore, defeats the purpose for performing the cost analysis, i.e., to get the most training value at the least cost. For these reasons, a comprehensive cost accounting methodology is essential to relating different levels of training readiness to different resource levels.

Comparability

Development of such a methodology vis-a-vis the costs of unit training should also accommodate meaningful comparisons between unit and institutional training costs. The operative word here is "meaningful." It is understood that consistency is important in aggregating and costing the various elements that enter into the total cost of training. However, comparability of the costs of training in units and in the training base does not mean that institutional and unit training cost summaries should necessarily include identical elements of cost. This is indicated by the following basic tenet of cost analysis: the cost estimate of an activity should exclude those costs which would exist even in the absence of that activity. Thus, there are particular products and services which can be identified as expenses of conducting training in the training base but which are not considered to be expenses of conducting training in units.

Take, for example, tank procurement costs. Costs incurred for tanks which enable a USAREUR tank battalion to fulfill it NATO mission--and are therefore also used in unit training--should be kept separate from the cost of tanks procurred for use in institutional training. The key factor is that the cost of the tanks for institutional training would not be incurred if that training were not conducted; therefore, those costs should be included in the cost of the training. Other considerations could govern however, over and above this basic cost. One could assume that given the short war concept (less than 30 days), the training base would cease to

function and all of its assets (personnel and equipment) would be committed as replacements. Given this scenario, the training base tanks should then be considered "war reserve stocks" and not be included in training base costs.

OMA Program 2 Mission Costs

The first step in justifying the cost of unit training is to identify that portion of OMA Program 2 Mission funds which are expected to be expended in the support of training. The specific training and frequency at which it is conducted, as identified in the unit training guidance, serve as the basis for costing efforts. As noted in chapter IV, the training guidance would identify a unit's training requirements in terms of training drills, battle drills, ARTEP missions, and non-ARTEP missions which may be aggregated and categorized for costing and scheduling purposes by type training day.

The general criterion for developing cost estimates for the different types of unit training days (FTX, CPX, ARTEP, etc.) is the extent of use of vehicles and other operational equipment--such as generators, radars, radios, and particular training devices--for training purposes. The use of this materiel places demands on POL and spare parts stocks which are funded out of Program 2 Mission. Additionally, if an analysis of a particular type training day identifies a high dollar value expense not usually included in the above category, such as the cost of computer time associated with computer-assisted war games, that expense should be assigned to the cost of that type day (CPX in this instance). On the other hand, the identification and matching of such low cost items as paper or chalk with particular type training days in most cases would cost more to accomplish than the information would be worth.

Projecting Costs of Type Training Days

In order to establish effective costing criteria for different type training days, a systematic methodology is necessary. The FORSCOM training management control system (TMCS) is an operative management tool that can be employed in this manner. Under this system, the trainer identifies, by number and type of equipment for each type training day, the requirements for cost-sensitive materiel. Usage rates, such as miles driven, hours operated, or rounds fired by type of ammunition, are also included for each unique piece of materiel. The recording of the materiel requirements is simplified by TMCS coding worksheets which include a listing of the cost sensitive materiel found in different types of battalions.

The preliminary identification of the equipment requirements--to include usage rates--to be associated with a type training day may be a judgment call on the part of the trainer. More refined estimates of equipment usage rates are possible through the use of historical data which is collected explicitly for this purpose. Each type training day can be

priced by TMCS by applying equipment operating cost factors to the equipment usage rate associated with each training day.

FORSCOM develops operating cost factors from its commitment accounting for management of unit supplies (CAMUS) system data which are reported by FORSCOM installations. CAMUS prices a unit's spare parts requisitions by type of equipment, as identified by the weapon system designator code (WSDC). The operating cost identified by the code is an automatic by-product of CAMUS. The cost data by FORSCOM installation, plus usage data (in miles per hour, or rounds) for the like costing periods have enabled HQ FORSCOM to identify specific cost-per-mile, cost-per-hour, and cost-per-round factors for each type of equipment. Cost factors for POL consumption by type equipment have also been developed from historical data, as have equipment-operating cost factors in USAREUR through a system known as control of logistic expenditures (COLEX). The USAREUR factors are compatible with TMCS.

The above cost factors are applied against the usage rates for the cost-sensitive equipment (vehicles, generators, etc.) for each type training day. These automated computations made by TMCS provide reasonable estimates of the OMA Program 2 Mission cost for each type training day, with the exception of those classified as "little or no" cost. As stated earlier, the expense of data collection which would be incurred here could not be justified. However, such costs are aggregated and accounted for in what is termed as the fixed cost of ownership.

Fixed cost of ownership is defined as that portion of OMA Program 2 Mission cost required for day-to-day sustainment of the unit, excluding field training. Merely for a unit to exist, it must incur certain basic costs independent of its various nonrecurring actions, directed exercises, and field training. This is the fixed cost of ownership. The HQ FORSCOM planned effort to validate fixed cost estimating techniques should be pursued.

Other Costs of Training

Although funds to conduct unit training are included in OMA Program 2 Mission, not all funds which are sensitive to training conducted in units are included. For the Army to be able to relate unit training readiness to its requirements for resources, these funds should be identified. The OMA Program 2 Mission portion of the total cost of unit training can be estimated using TMCS as discussed above. The question is, What additional costs should be included in the total cost unit training? Since OSD generally accepts the cost elements included in the institutional course-costing methodology (pay and allowances, equipment depreciation, ammunition, per diem, and indirect costs) it is reasonable to consider these cost elements in addressing the question of the total cost of unit training.

Pay and Allowances

Military and civilian pay represent a major cost to the Army for conducting business. For fiscal year 1978, 49 cents out of every dollar in the Army's budget was programmed for this expense.[26] There are distinctions to be made, however, between what those dollars are directly allocated for and what they are actually buying. The pay for trainers and trainees in the training base is accepted as a cost associated with the benefit of having a training base, that benefit being enhanced unit training readiness. While a cost savings could be realized by eliminating the training base, since pay and other personnel-related costs would also decrease, there would be a significant degradation in the training readiness of field units. If such a degradation were accepted, the savings could either be reallocated within the Army to pay for products and services not previously affordable, or be withdrawn from the Army's control through budget cutbacks. In any case, it is reasonable to consider the pay of training base personnel as a cost of training conducted in the training base.

The treatment, however, of personnel-related costs associated with training conducted in units is considerably different. The only personnel costs to be considered as an expense of unit training are the costs connected with personnel augmented above a force unit's authorized TOE strength for the specific purpose of training. There is a school of thought, nevertheless, that suggests unit training costs should also include a pro rata share of the pay and other personnel-related costs of those authorized by unit TOE's. Time devoted to training activities would be the basis for prorating the costs.

Prorating Pay of Unit Personnel

From a true "cost to the Army" perspective, it appears that the intensity and diversity of unit training do not affect pay requirements for the general purpose forces. Two training events involving different levels of equipment usage will generate different mission costs (POL/spare parts); however, neither training event generates a pay requirement. The pay costs exist whether the unit conducts field exercises 365 days a year or does no training whatsoever. Thus, a pro rata share of the pay of TOE personnel should not be identified as a cost element in analyses designed to estimate the resources required to achieve a given level of training readiness. However, the pay of any military, civilian or contract personnel assigned to augment the TOE for training purposes would be included in the cost of unit training.

Including pay as a cost element for unit training would result in greatly exaggerated estimates of resource requirements with serious results. The pro rata share of the pay associated with one week of training for the personnel of a Mechanized Infantry battalion, for example, would be approximately $150,000. If a reduction in training were programmed,

the corresponding decrease recommended for the Army budget request would be significantly overstated by the amount associated with the pay of the TOE personnel. The resulting shortfall, however, would not become evident until the affected programs were underway, thus forcing unexpected curtailment or restriction.

The significance of excluding TOE personnel pay from unit training costs extends to analyses of situations which address cost trade-offs. Inclusion of such personnel would prevent any accurate assessment of the cost benefit of training particular tasks at a particular training site. Consider a proposal to transfer from the training base the training of mechanics to fill divisional maintenance battalions. The training of the mechanics would be conducted by the maintenance battalion using existing on-the-job training (OJT) procedures. The pay savings realized by the reduced training base requirement should not be offset by a pro rata share of the pay associated with time devoted to OJT by the battalion's TOE personnel since there has been no change in pay cost associated with the battalion as a result of absorbing the OJT mission. Although the production/training time ratio for the battalion would decrease significantly, actual pay costs would remain unchanged.

The real cost of conducting the OJT is reflected in terms of what is sacrificed at the expense of OJT. It is reasonable to express this by means of a production measure of effectiveness (MOE). Assume the division's tank availability rate were a valid measure of the maintenance battalion's productivity. If there were sufficient slack within the maintenance capacity of the battalion such that the reallocation of personnel resources from maintenance duties of OJT activities did not affect the tank availability rate, a no-cost situation would exist. On the other hand, if the availability rate dropped, the cost of absorbing the OJT is the impact of having fewer operational tanks. While this fact in itself does not represent a dollar cost, it may have a serious effect on the unit training readiness of tank units as well as on the tank units' logistics readiness status.

The "full account" approach, which includes both training base and unit savings/costs, should be taken when evaluating effects of changes to training base requirements. Continuing the above example, suppose the OJT mission of the maintenance battalion caused the tank availability rate to drop from 92% to 73% and that the lower rate was judged to be unacceptable. Of a number of alternatives considered for improving the rate, assume it is decided to contract out sufficient maintenance workload to allow the tank availability rate to improve to the desired level. The contract cost is thus assigned as a cost of the OJT and should be subtracted from training base savings to arrive at a net savings or cost.

This OJT scenario demonstrates that the effect on units by training base reductions may be one or a combination of the following: no impact; reduced capability, but no cost; or increased dollar requirements, but no

change in capability as long as its effectiveness--as measured by the tank availability rate--was not affected. The fact that its production/training time ratio decreased is irrelevant with respect to changes in training resource requirements. The lower ratio does indicate, however, that ineffeciencies in production (e.g., slack time) have been reduced.

In evaluating the desirability of training alternatives, the operative criterion should be the impact which each alternative has on the effectiveness of the battalion. Assuming two alternatives were distinguished only by the amount of time allocated to OJT, if pay were considered as a cost element, the alternative consuming the least time would appear the most attractive even if the other alternative promised greater effectiveness. Thus, considering a pro rata share of pay as a cost of training in units may cause a less suitable training alternative to be selected mistakenly.

The above treatment of pay is just as valid for training conducted by combat and combat support units as it is for training in a combat service support unit. There is no relationship between the pay requirements for a Mechanized Infantry battalion and the training that the battalion conducts. If the battalion's unit training time requirements increased by one week, for example, as a result of training being transferred from the training base or an increased training readiness requirement, it would be incorrect to state an increased pay requirement for $150,000. The fact that the time requirement has increased, however, is extremely critical and will be addressed as a separate issue later in this chapter.

There are, however, limited situations in which training activities will have an effect on pay resource requirements associated with a unit's TOE personnel. The duration and location of some training exercises will dictate the payment of a family separation allowance and may change the level of payments made for subsistance. REFORGER is an example of such a training exercise.

Ammunition

Unlike pay and allowances, ammunition accounts for a significant cost of conducting a large number of unit training events, and it should be included in cost computations. In the past, ammunition requirements for training in units were centrally controlled. Allocations were made to the units in specific numbers of rounds for each type of ammunition. However, under the DA training ammunition management information system (TAMIS) being phased into operation, units will become directly involved in the management or control of funds associated with their training ammunition requirements. The capability exists within TMCS, given a minor modification, to identify the cost of ammunition associated with the different type training days.

Equipment Depreciation

While the depreciation cost of the total inventory of the major items of equipment in the training base is included in the cost of institutional training, a somewhat different approach should be taken to relate the procurement costs to unit training. The majority of a unit's equipment is required to be on hand regardless of the training it conducts. The cost of its TOE equipment and station property is an expense of having the unit in the force structure, and therefore is not primarily related to the training program.

Conversely, there is other equipment which is training unique and the costs associated with that equipment should be included in the cost of unit training. Examples of this equipment include the Redeye moving target simulator (MTS), television trainer (TVT), and the M70 TOW trainer. While it is not feasible to allocate the development and procurement costs of such equipment to particular training, the costs should be amortized over the expected life of the equipment and assigned as a fixed cost associated with unit training.

Additionally, operation and maintenance cost data bases need to be established for training unique equipment. These data bases would permit the development of usage cost factors which could be incorporated into the TMCS. The recurring costs associated with the use of training devices could then be included in the cost of conducting the training.

Per Diem/Transportation

The cost element of per diem/transportation should be assigned to specific type training days whenever possible. A large portion of per diem costs within a unit, however, cannot be related to particular type training days. A case in point is the cost of commercial travel to quarterly training conferences. Much of the per diem/transportation therefore, would be treated as a fixed cost of training in general.

Indirect Costs

The rationale for assigning indirect costs (base operations, post medical support, family housing administration, second destination transportation, among others) to institutional training is that the services generating the indirect costs would not be required if there were no institutional training. It is evident that the same rationale is not valid when addressing unit training. Unit training does not place any demands on the management of family housing, for example; such costs are incurred independently of the training of a unit. Generally speaking, the type services associated with the indirect costs of institutonal training are not sensitive to unit training. Thus, the cost for those services should not be included as a matter of course when making estimates of resources required for particular unit training activities. Exceptions

are addressed below.

A detailed analysis of the individual elements of indirect costs must be made to determine their individual sensitivity to training activities. Many of the costs, such as family housing management costs, are strictly expenses of having the unit on active duty, while other costs can be related to unit training. Although the in-depth analysis required to develop meaningful cost-estimating relationships is beyond the scope of this paper, the following examples are offered to present the general picture.

Base Operations

A number of the base operations accounts are candidates for cost-allocation investigation. The maintenance and repair of real property account incurs some costs which are related to training buildings, facilities, ranges and range roads. Training-unique facilities, such as the Redeye MTS and indoor ranges, may place measurable demands on the operation of utilities account. Additionally, some expenses within the minor construction account may be attributed to work generated by unit training requirements. Knowing that field training increases organizational maintenance demands, the cost for maintenance of materiel may well also be sensitive to the intensity of unit training. Exclusive of the base operations accounts, second destination transportation costs should be examined for their elasticity with respect to the levels of training in units. In addition to the minor construction costs within base operations, any construction projects in support of training funded out of the military construction appropriation should be considered as a training cost.

Support

A significant portion of the training development effort conducted within the training base is for the direct and sole support of unit training. The soldier's manual, commander's manual, skill qualification test, and Army training and evaluation program are examples of training development products whose costs could be amortized and assigned as a fixed cost of unit training. A more complete evaluation of the training development activities is required to identify all the costs that should be assigned to unit training.

A synthesis of the discussion of the cost of unit training is as follows:

There are three categories of high dollar costs which are particularly sensitive to training activities. The three categories are POL/spare parts, ammunition, and operation and maintenance of training devices. Because of the high dollar value of these categories, the costs should be captured on a type-training-day basis. TMCS can provide, by type training day, costs for POL/spare parts and, with minor adjustments can

provide ammunition costs. Operation and maintenance cost factors need to be developed for pertinent training devices. These cost factors, as accommodated by TMCS, will permit training device costs to be included in the "by type training day" costing. Additionally, there may be isolated instances in which per diem, transportation, or special supply (to include self-sevice supply center purchases) costs can be related to type training days.

The remaining cost categories considered to contribute to unit training costs include base operations accounts, second destination transportation, per diem/transportation, major construction, products of training development activities, Training Aids Service Center (TASC) and development and procurement of training aids/devices. In many cases, the demands of data collection or analysis will prohibit the assignment of costs associated with the above categories by type training day. It may be feasible, however, to assign some of the costs to a general category of training. For example, maintenance requirements for tank ranges could be prorated against all type days which include tank gunnery exercises. Additionally, some of the categories include both fixed and variable costs. The fixed portion is the cost that would be incurred to support unit training at almost any level of training intensity. Cost estimating relationships could be used to identify the variable portion of the cost.

A proposed listing of unit training cost elements is shown in Figure 5-1:

Direct Costs	Fixed	Variable
Mission..................................	X	X
Ammunition...............................		X
Training-Unique Equipment................	X	
Per Diem/Transportation..................	X	X
Training Supplies & Materials............	X	X
Training Development Products...........	X	
TASC....................................	X	X
Indirect Costs		
Base Operations (Portions of Selected Accounts).	X	X
Second Destination Transportation...............		X
Major Construction..............................	X	
Depot Maintenance...............................	X	X
Total Costs		
Total Direct....................................	X	X
Total Indirect..................................	X	X
Total Direct & Indirect.........................	X	X

Figure 5-1. Unit Training Costs & Elements

Comparability of Institutional & Unit Training Costs

The above methodology for describing the cost of unit training also facilitates cost comparisons of institutional and unit training. Since unit training does not include the cost of pay or other personnel-related costs (except as noted earlier)--while institutional training does--training in units should represent considerable dollar savings. This hypothesis is valid particularly with respect to high density/low skill MOSs. It is of questionable validity, however, when addressing low density/high skill MOSs. The inherent efficiencies of centralizing training of that nature, no doubt, would compensate in many instances the savings in pay and installation support associated with unit training.

Dollars vs Readiness

Caution must be exercised not to limit evaluations of institutional/unit training trade-offs to analysis of dollar cost differences. As noted earlier, time is scarce at the company and platoon levels, and training transferred from the training base, which cannot be absorbed in units without generating additional demands for training time, would have a serious, degrading effect on the unit's training readiness. The unit would be forced to reallocate some of its programmed training time to the training of skills transferred from the training base. The net result would then be a decrease of those SM/ARTEP skills for which the unit had to reduce its training time in order to accommmodate the exported training. This proficiency attenuation may create an unacceptable degradation of training readiness, particularly in high-priority USAREUR and CONUS units. In fact, it may well be that the very high levels of sustained readiness required for NATO defense will require significantly more training within the institution so that a "combat-ready" individual soldier is produced.

In the example of the maintenance battalion, the effect of transferring training from the training base was reflected in terms which are easily quantifiable (i.e., tank availability rate); however, the effect on combat battalions is more difficult to articulate. As related to NATO requirements, such an effect should be expressed in terms of training readiness, although that is difficult to measure. The concept of relating the training recommended in the unit training guidance to training readiness offers an avenue for improving this quantification.

Again, the impact of transferring the training of tasks from the institution to field units must be judged by the effect the transfer has on the unit's training readiness. We must ask, Will the reduction in training readiness be justified by the dollar savings? Do savings actually occur?

Effect of Reduced Institutional Training on Recruitment

The transfer of training from the training base to units may have a secondary effect on the recruiting market of the All Volunteer Army which cannot be ignored. One of the most important attractions of enlistment in the Army is the availability of training in skills easily translatable to the civilian job market.[27] If the training of such skills is conducted in the informal environment of units rather than in a structured institutional setting, the attractiveness of the skill training may be seriously erroded in the eyes of prospective recruits. Therefore, the increased recruiting costs which would be required to compensate for the loss of the recruiting incentive of formal civilian job-type training may be greater than presumed dollar savings realized by transferring the training from institutions to units.

Summary

Budget cuts are frequently mistaken as savings generated by efficiencies, rather than being recognized as the program cuts which they are. In his book, Program Budgeting: Theory and Practice, Dr. Frederick C. Mosher offers the following words of caution.

> "...a very large part of the "economy" reductions in, for example, the Army appropriations, actually come out of a program rather than out of economies in the execution of the program. This fact may be disguised to some extent by retaining the basic program but putting off to future years its accomplishment, such as President Truman's determination in his "stretch-out." Or it may be concealed in the Budget Bureau's or the Congress' substitution of their judgment for the military department judgment as to what is needed.... But in the vast majority of cases, what is reduced is what is bought and done; it is at least doubtful that reductions usually result in the buying and doing of the same things at less cost." [28]

The problem at hand is indeed a complex one; however, it is paramount that the Army develop a means of relating resource requirements to training readiness in a language that can be understood by all. A method is needed which will minimize the situations where unsupported judgment governs the decision-making process. The methodology outlined above is offered as a means for expressing what is bought with the training dollar. Until such a system is in effect, degradations to training readiness will continue to be mistaken for budget economies by those who see fit to substitute their judgment for that of the trainer--civilian or military.

FOOTNOTES

[1]Hearings before a House Subcommittee of the Committee on Appropriations, 82nd Congress, 1st session, (1953), p. 90.

[2]Joseph C. Bernado and Eugene Bacon, American Military Policy, p. 73.

[3]T. Harry Williams, Richard N. Current, and Frank Freidel, A History of the United States to 1877, p. 208.

[4]COL R. Ernest Dupuy (Ret), The Compact History of the United States Army, pp. 43-49.

[5]US Congress, Appropriations, Statutes at Large, 1st - 5th US Congress 1789-99, Act of 2 September 1789.

[6]Dupuy, p. 58.

[7]Frederick C. Mosher, Program Budgeting: Theory and Practice, p. 55.

[8]Based on author's review of War Department Appropriations for 1800-1815 found in pertinent congressional records.

[9]US Department of War, Regulations of the US Army, 1895, p. 26.

[10]Dupuy, p. 164.

[11]James E. Hewes, Jr. From Root to McNamara: Army Organization and Administration, 1900-1963, p. 273.

[12]Ibid., p. 277.

[13]Ibid., p. 278.

[14]Mosher, p. 111.

[15]Hewes, pp. 278-279.

[16]Mosher, pp. 106-113.

[17]Charles J. Hitch, Decision Making For Defense, pp. 32-39.

[18]Ibid., p. 30.

[19] Insights on the Army's Medical training were derived through the author's interview of personnel in the Professional Education Division and Resource Planning Programming & Analysis Division of the Surgeon General's Office, Headquarters, Department of the Army.

[20] US Department of the Army, Commander's Manual 11B and 11C Infantryman, FM 7-11B/C/CM, p. 1-3.

[21] US Department of the Army, Training and Doctrine Command, Inclosure to Letter, Cost Analysis of Individual Training, 3 January 1978.

[22] US Department of Defense, Office of the Assistant Secretary of Defense (Manpower & Reserve Affairs), Military Manpower Training Report For FY 1978, March 1977, p. X.

[23] US Department of the Army, Report of the Board for Dynamic Training, Vol II, Final Report, 17 December 1971, pp. 73-75.

[24] Additional discussion of the Army Readiness Reporting System is contained in the Army Training Study concept paper, Training Proficiency, Readiness and Combat Effectiveness, by MAJ David S. Blodgett, Chapter V.

[25] US Department of the Army, Office of the Deputy Chief of Staff for Operations and Plans, Inclosure to Letter, OMA Program 2 (Mission) Funds for Training, 28 February 1977.

[26] US Department of the Army, Office of the Army Comptroller, The Army Budget, FY 1978, March 1977.

[27] LTC Grant S. Green, Jr., Individual Training, Army Training Study Concept Paper.

[28] Mosher, p. 234.

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INDIVIDUAL TRAINING

by

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CHAPTER I

INTRODUCTION

The training mission of the Army is to attain and maintain sufficient operational readiness to conduct and win combat operations. This state of readiness is accomplished through a mix of individual and collective training conducted in the training base and in the operating force.

Individual training is that which the soldier receives in institutions or units, and which prepares the individual to perform specific duties and tasks related to his assigned MOS and duty position.

Neither the quantitative nor qualitative demands for military manpower, nor the resources out of which they must be satisfied, are constant. The relationship between resources and requirements is a constant problem for military manpower and training managers. To maintain a military force of the required size, the Army must continually take in new personnel to replace those being separated. The relationship of this personnel inflow to outflow is a major determinant of military manpower and training policies.

Closely related is the rate of technological change since World War II which increasingly has complicated military tasks and which has involved new types of costly, long-term specialized training. Thus, how in this highly technical environment--given changing social values, the shrinking all-volunteer manpower pool, an improving economy, and resource constraints--can a capital-intensive Army continue to attract and best train individual soldiers?

The young men and women who will win future battles will be more difficult to recruit, in contrast to the days of the "unlimited supply draft." Today's soldier, as well as tomorrow's, will probably be very average or, in some cases, below average in terms of mental capability. How do we train these soldiers in the sophisticated skills required to operate technically advanced equipment?

Whether the training problems of today's Army can be solved remains to be seen. We, the Army, must provide considered answers to difficult questions. Some of which relate to reductions in the training base--the

DPS 040 "type" actions. Additionally, recruiting will become more difficult, weapons will become more complex, resources will become more constrained, and the Army's training mission either will remain basically unchanged or will become more difficult. Only by chipping away at the challenges and developing innovative, new solutions for them can appropriate training occur.

It is within this environment of resource constraints, changing social values, increased awareness of Reserve Component problems, a reduced manpower pool and, more specifically, increased systems technology and the associated individual training, that this study has been conducted.

It is not an attempt to solve all the challenges. In all likelihood, some will not even be identified. In many cases, conclusions and recommendations will not be made due to the limited scope of the research. Most of what is included is not particularly new--no radical solutions are proposed. Rather, this study attempts to define briefly the environment both that the Army is living in as a result of outside influences and that which we, through our systems, have created. It will identify some of the major improvements in the training management system as well as some recurring problems. Finally, this study will propose some training alternatives. By highlighting certain problem areas and alternatives, necessary emphasis can be brought to bear.

CHAPTER II

THE TRAINING ENVIRONMENT

Army training has become a very complex and dynamic process. As a result, trainers are constantly trying to improve techniques and technology, recruiters are attempting to fill the ranks from a constrained marketplace, and personnel managers continue to define policies and develop systems with the ultimate objective of providing a trained soldier to the unit when needed.

With each initiative the Army has in some way attempted to improve either efficiency, or effectiveness, or both. It has not always been successful, however, in that each step is affected by a variety of external environmental influences.

This chapter addresses that environment, with specific emphasis on the efficiency and effectiveness of individual training, and those factors which tend to strengthen or weaken the attainment of these two objectives.

Efficient? Effective?

Training, and in particular the Army's Individual Training Base, is subjected to constant and intense pressure by various internal and external agencies demanding more efficiency. The CY 1977-78 OMB Issue Paper #17 and DPS 040 are only two of many vehicles that have had or will have major impact on the training base, its efficiency, and certainly its resultant effectiveness.

Two key issues in justifying quality training center around the Army's ability to measure efficiency (primary concern of Congress, OMB, and OSD) and effectiveness (primary concern of Army). At present there are, with few exceptions, almost no training cost-effectiveness (efficiency) ratios employed in OSD nor cost-effectiveness functions that would permit the comparison of current and alternative training philosophies, methods, procedures, and goals. As a consequence, the DOD and the Army itself cannot assess the true impact of implementation of alternative training systems.[1]

Recent analysis of efficiency has centered around comparing student

staff ratios of the training base with those of civilian schools, a measure of efficiency now generally discounted by OSD. More recently, measurement based on cost per graduate, and cost per student man-year has been espoused.

Cost per graduate is viewed by training managers as a promising, though not fully tested management tool. However, student man-years fail to offer a sound basis for measuring overall training efficiency and DOD is continuing to work with the Services on a standard course costing methodology.[2]

Until this is done, the Army must develop, refine, and test its own efficiency yardsticks. This is particularly important in light of recent training innovations, which allegedly have improved both the efficiency of the training system, and the individual effectiveness of the soldier.

The primary objective of individual training is to produce soldiers who are disciplined, dedicated, and able to perform in jobs which contribute to winning combat operations. The manner in which the soldier accomplished this objective is a measure of training effectiveness. How good is the training base in achieving this?

Although progress at this point is extremely difficult to quantify, some has been made. Even though the Army has not yet established a solid baseline for comparing current "systems-engineered" training, specifically criterion-referenced instruction (CRI), to earlier normative based training, there are some interesting preliminary findings.

An independent evaluation team from the Infantry School, the proponent agency for BT and AIT (Infantry) instruction, compared the performance of samples of graduates from a conventional training program conducted at Fort Jackson and the Experimental Volunteer Army Training Program (EVATP). The evaluation team prepared and conducted the tests while HumRRO analyzed and interpreted the data. Tests compared trainee performance in the following selected skills:

<u>BT</u>

1. First Aid	46% performance gain
2. CBR	a. 46% performance gain on using protective mask b. 54% performance gain on treating nerve agent casualty
3. Land Navigation	34% performance gain
4. M16	20% performance gain
5. Guard Duty	12% performance gain
6. Individual Tactical Training	No Change
7. Drill and Ceremonies	No Change

AIT

1.	M72 LAW	82% performance gain
2.	Land Navigation	50% performance gain
3.	M79 Grenade Launcher	36% performance gain
4.	Communications	31% performance gain
5.	Landmine Warfare	30% performance gain
6.	M60 Machinegun	22% performance gain
7.	NVD (Starlight Scope)	11% performance gain
8.	.45 Cal. Pistol	No Change
9.	M203 Grenade Launcher	No Change

Figure 2-1. Trainee Skill Performance

Generally, these performance gains, in both basic and Infantry MOS training, were registered by men at all levels of aptitude and resulted in the following conclusions:

a. A performance-based training system that integrates basic and Infantry MOS training produces graduates with higher levels of demonstrated skill proficiency than does the conventional system (split BT/AIT).

b. The system permits the attainment of higher levels of skill performance within the same or shorter time frames.

c. Performance-based training permits high achievement by low as well as high mental category personnel and tends to lessen achievement differences attributable to aptitude level.

d. The use of an absolute "Go" or "No Go" criterion of skill attainment is feasible and administratively practicable.

e. The system provides a means for frequent assessment of the development of skill proficiency, in that:

(1) It provides an important feedback loop during instruction to both trainees and trainers.

(2) Close monitoring of performance data by training managers provides a quick-response quality control system whereby strengths and weaknesses in the training system can be pinpointed.[3]

In more recent tests, comparison of matched samples of trainees using performance-based, instructional/criterion-referenced testing programs with previous lecture-demonstration-practice approach showed marked superiority across all mental categories for those instructed by the performance-based approach. The comparisons in Table 1 are self-explanatory.[4]

COURSE/MOS	COURSE LENGTH (BEFORE CRI/ AFTER CRI) IN WEEKS	% REDUCTION IN COURSE LENGTH	% ATTRITION (OLD/NEW)	ANNUAL TRAINEE MAN-YEAR SAVINGS
17C Field Artillery Target Acquisition Specialist Course	8/4.5	44	21/6	57
17B Field Artillery Radar Crewman Course	10.4/8.0	22	15/5	17
26B Field Artillery Radar Maintenance Course	25/22	12	17/1	12
93F Artillery Ballistic Meteorology Course	9.8/6	39	12/8	12
35D Meteorological Equipment Mechanic and Repairman Course	9.8/8	18	18/15	3
27E Wire-Guided Missile Repairman Course	14.6/12.6	14	13/10	16

Table 1. Economies of Criteria Referenced Instruction

Similar results have been achieved in many areas of the private sector as well. As an example, even before the earnings of Xerox dropped 1.8 percent from 1974 to 1975, they were attempting to improve efficiency and increase productivity. One effort was an innovative training program for copier service technicians based on criterion-referenced instruction (CRI). By mid-1976 the new technique had achieved some commendable results, namely: training time was reduced from seven weeks to an average of five. Productivity also increased, in that newly trained service technicians were handling a weekly workload 20 percent greater than conventionally trained personnel. The company reported a $2.5 million savings from late 1974 until mid-1976 as a result of CRI implementation.[5]

Similar results were achieved by Pacific Gas and Electric Company involving operators of a wide variety of reproduction equipment. After the introduction of CRI, average training time was reduced by 30 percent at a savings of approximately $552 per trainee.[6]

ARTS-sponsored tests will provide more insights as well as analytical data on which to compare the two different training philosophies.[7]

Although CRI seems to be a success-oriented, cost-effective training methodology, there have been several problems with regard to course design--specifically in the area of "self-pacing." Here, service schools have occasionally made two mistakes. The first is that they have frequently lumped four separate and distinct training "revolutions" (constrained, critical task list; performance orientation; criterion evaluations; and self-pacing) under the umbrella of self-pacing. The second problem has been emphasis on increased student performance rather than student man-year savings.

The answer to soldier performance both in the institution and on the job relates directly to all four "revolutions." If each is not adequately addressed by the trainer, the total strategy may fail. As an example, unless schools examine closely specific job training requirements there are a large number of low frequency tasks which may be taught. The major effects of constrained task lists derived from complete front-end analysis are, first, the opportunity to reduce course length thus creating efficiencies and, second, to minimize critical tasks resulting in improved learning.

Performance orientation requires that the bulk of training time be based on performing the job task, not on information-passing in discussions, lectures, or conferences. Because self-paced courses are built on performance orientation, considerably more job task practice is required.

Criterion evaluation demands establishment of certain standards based on job requirements and student evaluation against those standards. Examination of tests in presystems-developed courses indicates that a

large amount of testing was normative referenced. Furthermore, it is imperative that test design include evaluation of critical performance skills. In doing so, the Army may lose some efficiency because the "Go or "No Go" element of self-paced courses might require more instructors in order to conduct the necessary performance evaluation. However, this is where the performance or effectiveness result of the course is attained.

In summary, each step--selection of critical tasks, performance orientation on specific tasks, evaluation against standards, and self-pacing, which enables the student to move at his own speed--is important and must be complete.

In addressing the second problem, increased student performance, the service schools must do two things. First, they must ensure that the evaluation instrument is one which will give a high degree of confidence that soldiers can perform tasks in the field. For example, rather than final performance being based on one successful operation, the student might be required to do several operations to minimize chance occurrence and to provide better retention. Second, schools also need to consider greater use of end-of-course examinations. The final examination should be a comprehensive test of all critical tasks taught, and the soldier should not leave the training institution until he can perform them. Subsequent to arrival in the unit, the new soldier should be reexamined to determine what he was taught, what he forgot, and what critical tasks based on his specific job remain to be learned. Based on criticality of tasks and learning decay feedback, the institutions would modify what they teach, and the way they teach it.

As training managers continue to be faced with limited resources, one of the greatest potential producers of efficiency and effectiveness becomes simulation. Though simulation is not the panacea for all training problems, it presents a cost-effective solution to many and can certainly contribute to individual proficiency. Although some individual training devices such as the Synthetic Flight Training Simulator (SFTS) have relatively high initial costs, eventual payoffs both in dollars and training realism are significant. As an example, introduction of second generation flight simulators at the Army Aviation Center several years ago enabled the school to reduce undergraduate aircraft instrument hours from 60 to 20. Simulation hours increased from 7.5 to 40 hours and total flight time was reduced from 192.5 to 175 hours.[8] Another proficiency bonus, although difficult to measure, is the ability of the instructor to create virtually hundreds of different flight conditions and emergencies that cannot be duplicated or practiced in flight. These full resolution flight simulators provide a technical approach to tank crew and other fighting vehicle simulators. Many other simulators and devices such as the Field Artillery Trainer (BT-33), the laser rifle, and the Conduct-of-Fire Trainer have been tested and proven to be effective methods for individual skill transfer.

In the area of engagement simulation, although normally a collective learning experience, realism has been increased by enabling the trainee to determine the relevance of his individual actions to successful combat outcomes, and hence be motivated to learn. The realism of these devices tends to cause the soldier to participate with much of the intensity that he would have on the actual battlefield. There is the definite indication that application of these training techniques has improved individual proficiency.

With respect to cost, there is little doubt that simulation is economical. The table below shows a comparison of costs of tank main gun versus subcaliber ammunition.

MAIN GUN ROUND	COST	-VS-	SUBCALIBER ROUND	COST
HEP	$122.83		.22 Cal LR	$ .01
HEP-TPT	85.72		5.56mm	.08
HEAT	158.12		7.62mm	.11
HEAT-TPT	110.81		.50 Cal	1.02
APDS	161.97		20mm	2.65

Figure 2-2. Ammunition Comparison Costs[9]

A slightly less dramatic comparison involves the TRADOC rifle marksmanship training effectiveness analysis and the associated basic rifle marksmanship tests. These indicated that greater proficiency could be achieved through modified training techniques and at least equal proficiency could be realized by a mix of standard service rounds and .22 caliber ammunition. The latter can be used with M16 rifles by attaching a rimfire adapter. In addition to substantial cost avoidance ($ .08 for a standard service round versus $ .01 for a .22 cal. round), these devices permit units to use local training areas or RC units to use .22 caliber ranges in their armories.[10]

For the future, the goal should be to provide a full range of devices to support individual training, particularly for critical, rapidly decaying skills. However, acceptance and use of simulators which reach the field must be improved. Many require special knowledge and effort. In units where the requirement for high levels of combat proficiency is not the most urgent of the daily pressures on commanders, the resources in people and time required to use simulators may be devoted to more pressing requirements. In addition, the extensive use of simulators is a relatively

new facet of the trainer's and training manager's world. The process of assimilation is evolutionary and many simulators go unused. It is particularly important that the Army, to include the Reserve Components which face unique and severe constraints in time and maneuver areas, move forward in this area. Without increased simulation, whether it be in the form of small, exportable devices or those which are more exotic such as the Synthetic Flight Training Simulator, the Army will not be able to afford quality individual training.

Related to the understanding, acceptance, and use of simulators is another part of the total training effectiveness equation--increased education of the field in basic training management. Although commanders should be the best training managers, many do not understand the basic philosophy. To a great extent this can be attributed to the fact that two key documents, soldier's manuals and commander's manuals, are just now getting to the field in any quantity and the philosophy has not "sunk in." The first document tells the soldier in which tasks he must be proficient to be MOS-qualified. The second document provides the commander with the same critical tasks, outlines his individual training responsibilities as well as those of the institution, and explains how to develop a meaningful training program. A measure of the commander's ability to "put it all together" to achieve individual proficiency is the skill qualification test (SQT).

Even though the service schools have been designated as being responsible for total MOS proficiency, units will rarely receive fully-trained soldiers from the training base. The "systems approach" not only determines what should be taught, but where. TRADOC and the schools produce the training materials and conduct much of the training. However, a considerable amount of training is left up to the unit, supported by training materials developed and exported by the training base.

Prime Movers

The Army's ability to measure or influence the efficiency or effectiveness of the individual training just described does not begin or end with training base initiatives or the measurement indices previously discussed.

This section describes the basic management framework, generally controlled from outside the training base, which influences the training system. The success or failure of personnel and training managers to recognize, and correct if necessary, these influencing systems, policies, and programs will to a great extent determine whether the Army will achieve efficient and effective individual training.

Development of Individual Training Programs

The key to understanding the impact of the "total system" on individual training is understanding the way in which individual training

programs are developed.

There is probably no single system in the current environment which has elicited more comment than that which is used to compute training requirements and programs. There is also probably no system which can contribute to, or detract from, training base efficiency or unit effectiveness more than this one. The following simplified description divides this complex system into its main components for easier understanding.

The development of individual training requirements begins with authorizations, or the Army Authorization Document System (TAADS). At HQDA, TAADS contains MOS and grade totals by unit as well as an aggregate total of the Force Accounting System (FAS), which includes the aggregate officer, warrant officer, and enlisted strengths for each unit in the force. As a starting point in computing training requirements, ODCSOPS, using a data processing system called the Structure and Composition System (SACS), reviews all units in the force structure and compiles total worldwide authorizations using the Personnel Structure and Composition System (PERSACS). The PERSACS contains current and projected authorizations and is recognized as the only acceptable document for MOS and grade authorizations.

Closely related is the Army manpower program which is the official Army projection of future strength, gains, and losses of the total force. This program, produced by a computer model called the Enlisted Loss Inventory Model/Computation of Manpower Programs Using Linear Programming (ELIM-COMPLIP), is the basic Army personnel document for military appropriations, the Army budget, the 5-year defense plan and the program objective memorandum (POM). It also provides the basis for Active army and USAR recruiting objectives.

The loss and gain data produced by ELIM is input to COMPLIP, a linear programming model. Various constraints, such as end strength and man-years directed by Congress, recruiting objectives, training base capacities, and/or policy decisions are also included. The primary objective of COMPLIP is to determine the nonprior service accessions required to minimize the average difference between aggregate structure spaces and operating strength while remaining within all constraints. The optimal Army manpower program, once approved, becomes the official Army projection.

The real process of developing and planning individual training requirements now begins. To maintain the trained strength of the Army in each enlisted MOS, individuals must be trained continuously to correspond to changes in the force structure and to replace losses. The goal is to train sufficient numbers in each MOS, each fiscal year, so that the total number of trained personnel in each MOS equals the projected authorization as of the end of the fiscal year.

The actual computation of training requirements by MOS is done by MILPERCEN. This is accomplished by a computer model called the Personnel Inventory Analysis (PIA), using PERSACS output for projected authorizations and the enlisted master file (EMF) for personnel inventory. Other factors, such as the total aggregate accessions required to meet end strength, reenlistment rates, retirement rates, unprogrammed loss rates, basic training and advanced individual training attrition rates, and reclassification are also applied.

The final output is a training requirement for each four-digit MOS constrained to the total number of accessions the Army requires based on the Army manpower program. The accuracy of this requirement is to a great extent affected by the accuracy of source data such as authorization documents, the enlisted master file, and historical loss rates. The computer-generated requirements are reviewed by MILPERCEN MOS monitors. If a requirement appears questionable, the computer run is checked and, after coordination with personnel and force structure managers, adjustments are made as required. Completed requirements are forwarded to ODCSPER for review and a final comparison is made between the PIA output and the Army manpower program. Once this is completed, total manpower objectives related to MOS requirements become the Active Army training program.[11]

At this point Active Army MOS programs are consolidated with those of the Reserve Components, which are computed separately. In addition, requirements obtained through solicitation (nonMOS courses, other Services, etc.) are rolled into the total training program which is forwarded to the various quota managers and training agencies for implementation.

Systems and Programs

Army individual training is a big, dynamic business, dependent to a great degree on a very complex personnel management system. Because both have evolved in a fairly systematic manner, changes for the most part have been positive. Improvements in the following major areas have generally resulted in improved determination of training programs and management of training. However, there are some areas which require additional emphasis because they have a negative impact on efficient and effective individual training management.

Recruiting

The foundation of improved recruiting is based on better communications throughout the chain of command from the Army Secretariat level to the individual recruiter in the field. This, coupled with increased "professionalization" of the recruiting force, to include upgraded selection standards and requirements for successful completion of the Army's recruiting course, have significantly increased recruiting effectiveness.

Recruiter incentives have been gradually increased and some positions have been upgraded from NCOs to officers. Recruiting management has adopted weekly objectives which have greatly improved training base utilization. Advertising management has resulted in improved media management directed at the quality market. Market analysis improvements include new analysis techniques as well as formation of a Market Studies and Analysis Study Directorate in the US Army Recruiting Command (USAREC) that provides current market studies and surveys as well as long-range planning. This capability has been enhanced by development of a marketing and information system which further assists in long-range planning decisions. Coordination with other Services includes committees for joint advertising, education, and market analysis and research.

All of these initiatives have contributed to "selling the Army." The number of unhappy soldiers deceived by recruiters has dropped dramatically. Recruiter malpractice is all but over. Equally important is the virtual elimination of "phantom" reservations which were for several years a major source of training base inefficiency. The system is generally working and it has resulted in much more efficient use of training space and more satisfied, better trained soldiers. As indicated below, however, a number of future challenges need to be solved.

a. Maintenance of adequate resources and enlistment incentives is essential. Only by resourcing the US Army Recruiting Command (USAREC) to accomplish its mission in a constrained environment, and by offering attractive options and incentives (monetary, choice of training, choice of location, educational benefits, and the like), will future recruiting meet the Army's quantitative and qualitative needs.

b. There must be development of realistic, reasonably stable accession goals which are achievable and take maximum advantage of seasonality. Coordinated, this effort could reduce shortfall/overfill and allow trainers to structure courses to accept varying levels of quantity and mixes of quality.

c. The development of a longer range perspective of the recruiting market, which would allow training managers to structure training for varying quality, is necessary.

d. RC recruiting must be improved. This would minimize the current program shortfall that contributes to training base inefficiency, not to mention alleviating overall RC personnel shortfall and enabling career content goals to be met.[12]

The Army Authorization Documents System

As previously indicated, the Army authorization documents system (TAADS) provides major input into the development of individual training requirements. In the past, force structure changes have not been

determined sufficiently in advance of the effective date to allow related personnel actions to be accomplished accurately and efficiently. This has normally been caused by the fact that Army units had to react to frequent personnel and equipment authorization changes which were the result of management processes applied independently. The independent actions of these processes create turbulence at all Army organizational levels.

With respect to training, major command authorizations were not documented with the proper lead time for accurate computation of training requirements. Although not yet fully realized, a major step in overcoming this deficiency was proposed in the June 1977 Management of Change (MOC) study which determined that:

a. The schedule for authorization management processes can be modified to reduce the frequency of changes, to synchronize better the interactions, and to reduce turbulence.

b. The processes of the authorization management system can be limited to a schedule whereby change guidance is issued twice a year, documentation of the guidance is required twice a year, and unit documents change only twice a year.

c. Other alternative schedules of management processes can be synchronized to an update of TAADS twice a year. These schedules, as analyzed in the study, appear to offer three advantages:

(1) The authorization documents remain relatively stable, reducing the frequency of changes to the units and allowing the requisitioning process to work.

(2) The issuance of guidance can be scheduled to provide sufficient time for updating documents.

(3) The update schedule for authorizations can be synchronized to support force, personnel, and equipment policy decision milestones.[13]

As a result of these determinations the following "fixes" were adopted which should improve the accuracy of training requirement projections:

a. Authorization management prescriptions were developed to remedy time delay and synchronization problems identified in the analysis.

b. Alternative schedules were formulated to reduce the turbulence observed in the authorization management environment.

Solicitation

Solicitation (AR 351-7) is the process whereby a large number of training base customers request training space. This method of determining training programs, for all except a few closely controlled courses, is inefficient and inaccurate. Even though solicitation, which is accomplished two years prior to the training fiscal year, is updated approximately six to eight months prior to the fiscal year, very few customers can accurately project training requirements. As a result, programs are either not met, which results in inefficient use of training space, or personnel are trained merely to meet quotas. The magnitude of this problem can only be appreciated when it is realized that essentially all training programs, other than those for initial entry Active Army and Reserve Enlistment Program (REP), are developed in this manner. This equates to approximately 600 of TRADOC's 946 courses. The following are typical, though certainly not extreme, examples of shortfall in solicited courses.[14]

SCHOOL	COURSE	TNG PROGRAM	FY 77 INPUT
USAFAS	FA Off Adv	535	431
USAES	WO Adv	23	17
USASIGS	Defense Special Security Commo Syst.	223	77
USAIA	Pers Mgt	416	232

Figure 2-3. Solicited Course Shortfall

Although the determination of Active Army ASI/SQI requirements, which were previously solicited, has been passed to MILPERCEN, the process is still inaccurate in that the Army does not "manage" by ASI/SQI. Documentation is even less complete than for MOS. This procedure should be improved. The most accurate method would be a system similar to that used for computing enlisted MOS requirements (a comparison of inventory and authorizations). It would require that each course/skill be identified with an ASI/SQI or other code. Likewise, authorization documents and personnel master files would contain the same identifier. In this way, a comparison could be made, requirements calculated, and personnel trained and assigned based on worldwide need.

Course Control

Course control is an area, related to solicitation, where not nearly enough progress has been made. In the past, there has been little control at DA or TRADOC over the proliferation of training courses in the training base, particularly nonMOS courses. In many instances they have been established merely based on a request from a particular unit, agency, or even individual. Although there is still no systematic procedure for reviewing course need at the DA/TRADOC level for those currently in being, there have been procedures established at both DCSPER and TRADOC for reviewing and approving new courses.[15] This must be expanded to include

procedures for systematically reviewing all courses, to include firm guidelines so that only those jobs which cannot be taught in the field are trained in the institution. For every course taught in the institution, there must be an accurate and continuous means of determining requirements other than "we need it."

ASI/SQI Training

ASI/SQI training is a problem closely related to both solicitation and course control. Their associated inefficiencies are those involved with training personnel for specific skills and weapons systems not identified by MOS. As an example, consider past M60A2 requirements for Europe. The crewman was identified as an 11EW1 and the command requisitioned replacements by ASI. However, there was little assurance that the requisitions were valid in that there was insufficient effort by the field to manage or assign by ASI. In addition, there was currently no way for MILPERCEN to validate the requisition because the Requisition Validation Report (COPO 89) used by EPMD for verifying requirements did not reflect ASI. The only validation that was done was against a three-digit MOS. As long as command requisitions did not exceed three-digit MOS authorizations, MILPERCEN generally honored the request and transmitted ASI training instructions to the training base. As a result, Fort Knox trained approximately 100 percent of the total 11EW1 authorizations each year--an obviously inefficient process. With conversion to CMF 19, this problem has been somewhat overcome.

The inefficiency and impact on units is further illustrated in another example. MOS 76 (supply) personnel who trained in the computer-based property book system (ASI F9) and repair parts (ASI F8) are not assigned by ASI. One unit in Europe found it necessary to spend up to six months training new arrivals in such special skills.[16]

ASI/SQI will always be present in some form as equipment becomes more complex. The Army must develop better means of managing personnel so trained, particularly those in highly technical, low density skills. Until the system can identify more accurately training and assignment needs, critical skills, particularly low density high-cost ones, should be managed by exception outside of the current training and distribution system.

In the near future there are plans to test a modified COPO 89 report which will reflect ASI/SQI for USAREUR. However, the revised report may be too unwieldy. Two separate reports, one to validate three-digit MOS and one to validate ASI/SQI may be needed to control training requirements effectively and manage distribution.

Related to this problem is conversion to CMF 19. Although this action and the resultant elimination of some ASIs allow direct validation of requirements and overcome some of the over-training mentioned previously, other problems are created; namely, a short-range potential for MOS imbalance. Plans called for field reclassification (Skill Levels 1 and 2) of

all potential CMF 19 series soldiers. Conversion was based on command interviews and considered incumbency, experience, and schooling. An example of what may have happened is illustrated by the following: a soldier had been trained as an 11DR8 (Sheridan scout) and assigned to the 3d ACR at Fort Bliss where he served as a Sheridan crewmember. He subsequently transfered to Europe where he was assigned to an Infantry battalion scout platoon (M-113). At the time of conversion he was probably an E5, occupying a 19D (scout) position. Although he should have been reclassified as a 19G (Sheridan crewman), he was most likely reclassified as a 19D (scout) due to incumbency. This imbalance situation will be complicated further when the M551 completely phases out of the system and the 24 MOS 19G and H in each cavalry platoon are reclassified into 19E, F, and D.[17]

The impact of the above on individual training, both in the institution and in the unit, is significant. First of all, the conversion to MOS will eventually permit more accurate computation of training requirements because the skills can be identified and compared in the current system. There will, however, most likely be some near-term MOS imbalance as a result of reclassification. In all likelihood, this will cause major fluctuation in institutional training programs for some time as authorizations and personnel master file data are updated. It may also require some field transition training of 19D, particularly if a preponderance of 11D are reclassified into 19E, F, G, and H to meet tank needs.

In addition to the long-range positive training management impact, there is the negative effect of MOS proliferation which causes reduced flexibility for distribution and assignment managers. However, with the philosophy of increased task and job specialization, the number of MOSs will grow, contrary to the goals of EPMS. For the trainer, it will eventually mean more accurate prediction of individual training programs and therefore increased efficiency; for the field, it means increased specialization and probably a more effective soldier; for the personnel manager, it will provide a better means of validating requirements. For both the field and the personnel community, it forces better assignment management than that required under the "invisible" ASI system, resulting in overall improved training base efficiency and soldier effectiveness.

ELIM-COMPLIP

One system which has great impact on both training and recruiting, and one in which major improvements have been realized, is ELIM-COMPLIP. To summarize, the Army now has a system that can forecast future recruiting capability based on the past as well as the future environment. In addition, it is much more accurate in predicting losses and, therefore, requirements which translate into nonprior service training programs. As an example, when projecting expected total losses, the improved system ranges from +8 percent to -15 percent with an expected error rate of only +1 percent, whereas previous ELIM-COMPLIP varied from +41 percent to -21 percent with an expected error rate of +10 percent.

In February 1977, just prior to conversion, an error analysis was performed comparing projected adverse losses (TDP, EDP, misconduct, and unsuitability) against actual losses for the period March through November. The improved system projected +.43 percent as opposed to +3 percent for the old.

For December 1977, ELIM-COMPLIP projected approximately 20,800 total losses against actual losses of 21,000.[18]

Army Program for Individual Training

The manual process for managing individual training programs, known as the "White Book", has been modernized and today is automated by the Army Program for Individual Training (ARPRINT). The Army now treats the individual training program as a mission to the trainers when the ARPRINT, updated quarterly by HQDA (DCSPER), is forwarded to TRADOC, Health Services Command, and other training agencies for execution. The trainers assess the impact of the updated program on their current and programmed resources (dollars, manpower, and equipment) and adjust accordingly within the planning, programming, and budgeting system (PPBS). The DCSPER is responsible for the decision as to distribution of training spaces among Active Army and Reserve Component claimants. Should training capability shortfalls exist, usually due to late decisions, facility and equipment shortages, or foreign military training priorities, the total program data are reviewed by ODCSPER. The automated ARPRINT is distributed to all training activities and agencies who then adjust their existing class schedules to confirm to the total training program. Class schedules are forwarded from the trainers to quota control agencies. In the case of enlisted MOS courses, the agency is the Training Division, EPMD, MILPERCEN, where enlisted quotas are made available on the Recruit Quota System (REQUEST).

While the above discussion deals primarily with enlisted initial skill training, the ARPRINT displays all individual training programs to include those for officers, other Services, foreign students, civilians, and in-service personnel--both Active and RC.[19]

This is an impressive system; however, it is not yet the perfect automated program for developing and managing individual training programs. In reality, there is little change in the way training requirements are computed (TAADS, EMF, PIA, solicitation) and they are still subject to the inherent inaccuracies of those systems and methods. However, the ARPRINT does provide a real time automated management tool that is much more adaptable than the previous "White Book" system to rapid reference, update (four times/year) and interface with other manpower and budget management systems, and thus results in more accurate training management data.

Since the Army Training Requirement and Resources Systems (ATRRS)/ARPRINT is well "on board," it is essential that it meet the needs of both DA and the trainers. To do so, some trade-offs may be necessary.

Due to the complexity of the entire system, to include the inaccuracy of solicitation, training programs fluctuate greatly, frequently at the expense of the resourcing system. As an example, because of the changes in total TRADOC training loads projected for FY 1977, June 1975 (85.6K), October 1975 (84.1K), April 1976 (96.1K), March 1977 (102.6K), it was difficult to maintain a proper workload/manpower resource cycle.[20] This, of course, is magnified at the installation where relatively level scheduling must accommodate both seasonality and recruiting-induced input variations. Despite the fact that TRADOC and HQDA are currently using the same data base, other training base concerns include: retrieval capability at TRADOC for class schedules, input, or load data is limited; user guides have not been distributed to TRADOC; and management programs desired by the training base are frequently not contracted for and changes are made to current programs without sufficient coordination with the training base.

Reserve Component Training Requirements

Although still lagging behind Active Army procedures, development of USAR training programs has evolved from a manual operation based totally on solicitation to methods involving programmable calculators and comparisons of PERSACS and TAADS extracts with summary authorization documents. In addition, USAR training managers now review MOS changes and feeder patterns developed under EPMS and have established procedures to enable more accurate determination of female content based on interchangeable positions. The ARNG has gone a step further and developed an automated model that projects AIT requirements by MOS for nonprior service personnel. Development of the Automated Program to Project AIT Space (APPATS) has reduced a four-week manual process based on solicitation to a more accurate and faster procedure for projecting requirements.

These initiatives, as well as focused efforts by RC training managers, have resulted in some improvement. In FY 1975, the USAR required 5,974 changes in 75 MOSs. In the case of the USAR, these changes were against a total training program of only 14,987. In FY 1976, out of a total USAR training program of 22,997, only 2,557 changes were required.[21] However, work in this area must continue to receive the highest priority of RC training managers in order to minimize inefficient use of the training base as well as provide trained replacements to Reserve Component units when they are needed.

Recruit Quota System

One of the most successful systems in terms of accession and training management has been the Recruit Quota System, an automated enlistment and training space management system designed to enhance recruiting and improve training space management. REQUEST is a nationwide, real-time computer service using approximately 255 remote data terminals capable of simultaneously accessing a common data bank

containing the annual Army enlisted MOS training program. This system provides:

a. A real time message capability to all stations.

b. Recruiting qualification data that is centrally maintained and available to users on demand.

c. A high degree of assurance that only qualified applicants are enlisted.

d. Enlistment option information.

e. A real time method for reallocating training space quotas in response to field demand.

f. Enlistment distribution, matching applicant desires and aptitudes to the Army's capability to train within a hierarchy of need, thus ensuring full utilization of the enlistee's ability.

g. Army management with the capability to monitor and control first assignment enlistments and guarantees for selected MOSs.

h. BT and AIT location instructions for every accession.

i. Accuracy, reliability, and speed in managing training spaces.

j. Active Army, National Guard, and Army Reserve managers with timely, detailed information on the total recruiting and training space control operations.

In addition, there are two major ongoing projects which will further enhance training space management and thereby efficiency. One is an interface between REQUEST, the enlisted master file, and the Armed Forces Examining and Entrance Station (AFEES) Reporting System (ARS). This will provide accurate single source reporting of standard Army accession data to DOD agencies, Army reception stations, and personnel managers. The second project is the development of an accession management "thru-ticket" system. This will enable personnel and training managers to "track" and manage an accession from enlistment through training to the first unit of assignment--a development of considerable potential.[22]

New Equipment Training

In addition to some overall inaccuracies in predicting total training requirements, previously discussed, one of the greatest inefficiencies has been the Army's inability to project new equipment training requirements. A major step in overcoming this is MILPERCEN's Initial Recruiting and Training Plans for new equipment. These have been developed as planning guides

for the personnel community to identify the qualitative personnel requirements as well as the critical milestone dates which have to be met to ensure successful fielding of a particular system.

Another initiative is the soon-to-be-published TRADOC Regulation 600-xxx, "Integrated Personnel Support (IPS)." Its objectives are:

a. To influence the development of materiel systems with respect to personnel support, man-machine interface, training, testing, and other characteristics which affect personnel.

b. To plan, develop, acquire, test, and deploy the required personnel resources as an integral part of the materiel acquisition process.

c. To prepare the user and the Army personnel system to provide continuous personnel support when materiel systems are fielded.

d. To enhance operational readiness, improve personnel support, and reduce operating and support costs by achieving the preceding objectives.

The regulation describes in detail various personnel implications and appropriate actions. For this study, several are worthy of mention in that they should improve individual training management. For example, normally at the time of the materiel concept investigation, "personnel" is addressed only in very general terms. Under revised procedures, the TRADOC proponent would investigate the impact of the materiel concept upon recruiting, MOS structuring, training, and manpower authorizations. Furthermore, the proponent would plan for operator and maintenance training throughout the life cycle of the equipment. Initial training plans will be a coordinated effort by TRADOC, MILPERCEN, and DARCOM. The proponent school will continue to update training planning throughout the developmental cycle and ultimately establish resident training if appropriate.

Initiatives such as these, if they receive sufficient emphasis, will ensure that future individual training programs are timely with regard to fielding new equipment as well as compatible with regard to critical tasks.[23]

Turbulence/Turnover

Previous discussion has been primarily limited to single systems that affect the Army's ability to conduct efficient and effective individual training. This section deals with turbulence and turnover, which are probably the least understood, yet most criticized, aspects of the system, and ones which commanders frequently blame for inefficient and ineffective training. To more clearly understand these phenomena and their

magnitude, it is necessary to differentiate between personnel turnover and turbulence. This distinction is important because personnel turnover will most likely always be with the Army. However, managers can focus their efforts on and reduce turbulence.

Turnover is movement resulting from compliance with policies such as tour length, career development, and overseas manning levels, under a stable force structure. In this regard, the Army has vigorously pursued implementation of policies which effectively and realistically contribute to improved personnel stability. As an example, personnel turnover has steadily declined since the Vietnam conflict--the Army worldwide average tour in FY 1970 was 11.9 months compared to 26.2 months in FY 1976. Additionally, the FY 1978 budget reflects both reduced PCS moves and costs as a result of actions taken. For example, aside from the 22,000 moves required to eliminate involuntary tour extensions, total moves have been reduced from 680,000 in FY 1977 to 645,363 in FY 1978. Comparison of PCS costs in FY 1977 (less $50M to eliminate the extensions) with costs in FY 1978 (less $82M for extension of travel entitlements to junior enlisted personnel) reveals a reduction from $590M to $574M.[24]

Turbulence, on the other hand, is movement caused by such things as deviations from policy, short lead times, activation of new units, adjustments to the base and facilities structure, and reduction in the civilian workforce. Examples of these are special procurement programs for the Old Guard and USAREC, and unit rotation of Brigades 75/76. In addition, changing authorization documents have significant impact. For example, at DA level the training program has frequently not conformed with the latest training requirement because the most current documentation had not been forwarded to DA. At the major command (MACOM), the volume and frequency of changes creates workloads which result in undocumented changes or deferral of changes which need to be made so that training requirements can be computed. At the unit, frequent changes result in fluctuating authorization documents. During FY 1976, the average unit had six authorization document changes which caused frequent personnel requisitions and cancellations.[25] These factors, coupled with the personnel manager's requirement to fill requisitions based on valid authorization documents, have contributed to malassignment and field turbulence. In addition, changes in the Department of Army Master Priority List (DAMPL), and other factors which include selected enlisted personnel for overseas service (SEPOS), space imbalance, and various discharge policies such as the Trainee Discharge Program and Expeditious Discharge Program (TDP, EDP)--up 12 percent since FY 1974--have further contributed to what is commonly referred to as turbulence.[26]

Current opinions differ little from the information gathered by the Board for Dynamic Training in 1971, which showed that personnel turbulence was the greatest obstacle to training. This may still be the case. However, statistics fail to support fully the complaint--at least not in the magnitude previously experienced.

A COA study conducted in 1970 indicated an Active Army division averaged quarterly losses of 32-38 percent. This degree of turbulence amounted to more than 100 percent per year. The ramifications can be better visualized in terms of one CONUS division which estimated over 50,000 job changes during the fiscal year, creating a chaotic situation with regard to individual training and combat readiness.[27] Today, however, based on current unit readiness reports, CONUS and USAREUR divisions are averaging approximately 12 percent turnover per quarter.

However, this does not mean that significant movement affecting training at the lower levels is not occurring. In a 1977 HumRRO report, a representative sample of companies from an Infantry division were studied. Results at the end of a 4-month period, based on original unit rosters, show that:

a. 36 percent of the men stayed in the same job in the squad.

b. 24 percent of the men had left.

c. 16 percent were in the same squad but had changed jobs.

d. 21 percent had changed jobs and changed squads.

e. 3 percent had changed squads but kept the same job.

The typical squad experienced one movement per week (a person either entering or leaving the squad).[28]

Although a good example of turbulence at the "fighting level," it graphically illustrates the commander's influence on turbulence in that 62 percent was internally generated. In many respects, the commander at any level is the Army's primary contributor to turbulence. Consider, for example, the USAREUR request for 18-month tour length for first-term unmarried enlisted personnel. At the grass roots level, every time a commander fails to report SIDPERS data accurately, does not reclassify a soldier, fails to award an MOS if appropriate, or permits or requires a soldier to work out of his MOS, he is contributing to turbulence. All of these feed the training requirements system which, in turn, either provides the right man in the right skill for the right job at the right time--or fails to do so.

Units are able to conduct training and perform missions in a more effective and efficient manner when soldiers remain assigned long enough to become members of a team. Therefore, goals have been established to provide soldier replacements who can serve the most time in units before termination of service or completion of required tour length.

A major factor in understanding turbulence centers around the requirement to maintain the strength of units deployed overseas. This is the catalyst of Army assignment policies. In Europe, where the majority of

Army overseas units are stationed, the goal is to fill at least 95 percent of the first-term or lower grade requirements with soldiers just completing basic and advanced individual training. This not only increases the average tour length in Europe, but reduces the requirement to select soldiers from units stationed in CONUS to fill overseas vacancies (SEPOS). First-term soldiers sent overseas from CONUS units not only have to be replaced in their former unit, but have only 12 to 14 months service remaining as opposed to the soldier from the training base who will have about 30 months service remaining. Currently, the Army is achieving approximately 85 percent of overseas fill from the training base as opposed to approximately 33 percent in FY 1974. This has had a significant impact on reducing SEPOS-created turbulence, from highs of approximately 60 percent in FY 1973-75.

Other actions that have been taken to reduce turbulence are:

a. Elimination of the 2-year enlistment option.

b. Increased 3-year and 4-year enlistment goals (4-year enlistments increased from 8.6 percent in FY 1974 to 25.8 percent in FY 1976).

c. 2-year minimum CONUS tour.

d. First-term, 3-year enlistees allowed only one assignment.

e. First-term, 4-year enlistees in USAREUR normally stabilized for 42 months.[29]

There is somewhat of a dichotomy, however, in that, as previously mentioned, USAREUR recently requested that tours for first-term unmarried personnel be reduced to 18 months. The request is based primarily on the belief that this category of enlistee becomes marginally effective after 18 months in USAREUR and creates the greatest disciplinary problem. Although there is not sufficient PCS money to accomplish this at present, the FY 1979 budget proposed to Congress does include requests to reduce overseas tours of 4-year, first-term, unmarried soldiers to 24 months. This will no doubt tend to reverse some of the positive turbulence trends.

The overall effect of the above initiatives has been positive in more ways than just reducing soldier movement. Primarily as a result of the revised 3-year and 4-year enlistment goals and the goal of 95 percent training base fill for overseas, the Army has been able to transfer approximately 10,000 spaces from the individuals account (trainees and transients) to the operating force.[30]

The above results do not imply that there are no "people" management problems with regard to stability. Despite the use of ADP procedures designed to streamline personnel management functions, planning and systems automation continue to lag behind personnel management requirements. As

an example, there is a need for determining relative costs of assigning a soldier from one installation to a new duty station compared to assigning one from another installation. To a great extent, these "type" problems can be traced to two major deficiencies. First, the development of many personnel ADP systems were not properly planned or coordinated. Second, overall ADP system design has shown increasing divergence from the user's functional requirements. These two factors present a very real and serious problem in an environment where it will become increasingly important that the recruiting and personnel systems be more responsive to the needs of the individual and the unit. Systems must be developed which will permit management of recruiting in a very competitive, lower quality environment; retention and reenlistment to offset possible future recruiting shortfalls; and more selective assignment procedures, to include increased stabilization with possible reassignment by crew, section, or even unit. All of this must be done not just in peacetime, but it must also be capable of total system switchover during mobilization.[31] A plan for addressing this problem, Master Plan for Enlisted Systems (MAPES), will be discussed later in this chapter.

There is a strong feeling that no training system can be effective if the turbulence problem is not solved. On the other hand, there are those who believe that because of certain hard realities--namely dollars, tour length, and career enhancement policies--turbulence will always be with the Army. If it is something to be lived with and trained with during war, is the Army trying to build a system which is not realistic for combat? Should it be closer to the environment found in war and thus more realistic in which to train?

There is another school of thought that, even though turbulence may never be overcome, stability within units can be improved. Related to this philosophy is the feeling that stability of certain key personnel is the cornerstone of individual proficiency in the unit. In other words, it is far more important to stabilize the tank commander who can train the crew than to attempt to stabilize all individual crew members. This, of course, is based on the assumption that the entire crew cannot be stabilized as a result of various turbulence factors previously discussed. As one example, during the Korean War, General (then LTC) Harold K. Johnson attributed much of the initial success of his battalion, which had received only eight weeks of individual training and no unit training prior to combat, to the fact that he had some good key NCOs and had stabilized his officers.[32]

The problems of turbulence are even greater in the Reserve Components, who are not provided with some of the more sophisticated personnel management systems and who are faced with a highly mobile society where unit members are prone to follow the civilian job market. Add to this the Army's frequent adjustment of the Reserve Component force structure, and an extraordinarily difficult personnel situation has been created.

In a preliminary attempt to address partially the stability problem as it impacts on effectiveness, the "Kalergis Study" recently recommended assignment of an extra tank crewman per tank in certain units to minimize turbulence. An evaluation program is in progress to determine whether the extra crewman contributes to the crew staying together, thereby enhancing proficiency or whether he merely becomes an extra "detail man" for the unit.[33] Additionally, ARTS-sponsored tests will measure the effect of turbulence on tank and Field Artillery gun crew performance.[34]

A slightly different problem, but one which contributes directly to turbulence and training inefficiency, is attrition. OSD policy intends that attrition should not exceed the following:

	Percent of Male Accessions Lost Over 3 Years by Fiscal Year of Entry		
	FY 78	FY 79	FY 80
High School Graduates	25	23	23
Non-Graduates	48	44	44

Figure 2-4. Projected Attrition

The basis for concern centers upon an increasingly limited manpower pool and reduced dollars. It is felt that in a declining male market, annual accession requirements must be reduced or quality will suffer. Additionally, each soldier lost through attrition must be offset with a new accession who costs an estimated $6,000-$9,500 to recruit, process, and train. In general, OSD has been satisfied that the Army has correctly assessed the impact of accession characteristics on losses and that attrition will not exceed the limits for FY 1978. However, it appears that additional analysis by skill may be needed so that a better qualification job match can be made, resulting in increased trainability, job satisfaction, retainability, and effectiveness. A plan for gathering and using this information will be discussed later.

Despite these positive and measurable efforts, there is still more subjective work to be done in improving leadership and management programs which tend to improve the command climate and soldier's quality of life, thus reducing post-training attrition and resultant turbulence.[35]

Incentives

Discussion of individual training effectiveness is incomplete without some mention of personal incentives. In addition to the Army providing good training, soldiers must be motivated to learn and sustain knowledge. Although the desire for promotion (tied to the SQT) may be enough incentive for some soldiers, preparation and proficiency tends to be cyclical.

More incentives are required. Soldiers of all aptitudes need to be motivated on a reasonably constant basis. A possible solution is to provide incentives to a soldier who demonstrates task proficiency. There is nothing new in the basic rules of human behavior which are structured on a foundation of recognition and rewards, probably the greatest motivators.

A recent study conducted by the Army Research Institute (ARI) investigated the potential value of various incentives which might be used as rewards for enlisted infantrymen for acquiring individual soldier's manual skills.

Results indicate that monetary incentives are highly valued, particularly when they are given on a continuous or salary basis. Financial awards as low as a $10 a month salary increase were strongly valued by the participants. In addition to financial incentives, those dealing with the soldier's autonomy (such as being able to influence the next assignment) also fell within the group of highly valued incentives.

Most of the highly valued incentives, specifically the monetary awards and autonomy-oriented incentives, may not be feasible at this time. However, three incentives having high value appear feasible: promotion points, positive comments placed into personnel files, or special medals.

Analysis of moderately valued incentives indicates that many of these relate to some form of recognition for achieving skill proficiency. These include pass privileges and time off during duty hours, noncontinuous financial rewards such as a bonus or coupons of a fixed amount which can be exchanged for goods and services, and avoidance of work details.

Many of the moderately valued incentives appear to be feasible. The possible effectiveness of such incentives as a special pass or a recognition award in motivating training effort should be positive, for their ratings are roughly comparable to financial rewards whose values range from a $5 monthly salary increase to a $50, one-time bonus.[36]

Incentives could also take the form of a quick promotion. This would, of course, have to be coordinated with and to some extent controlled within the centralized personnel system. However, there were few past incentives more effective than a "hip pocket" promotion awarded to a proficient, deserving soldier. The personnel system should be sufficiently flexible to permit such incentives.

Soldiers in lower mental categories, which the Army may see more of in the future, can be influenced with similar incentives. As an example, one study investigated methods of motivating trainees of all aptitudes to learn. Although low aptitude personnel appeared to benefit little from training with those of high aptitude, regardless of the number in the squad, they did benefit when competition and rewards were introduced. Both squad competition and rewards decidedly increased motivation to

learn at all aptitude levels. The net result was that low aptitude individuals, supplied with incentives, were brought above the proficiency of average personnel in squads lacking incentives.[37]

When considering incentives it is important that they not be restricted to individuals in a small number of highly technical skills, but rather awarded across the spectrum of MOSs for all soldiers who attain and maintain an extremely high level of proficiency validated by frequent tests. This is particularly important in that units will most likely continue to devote considerable training time to collective tasks at the expense of individual skills. Thus, the individual "carrot" becomes increasingly important. It may also be considered appropriate that similar incentives be extended to crews who maintain a high level of crew proficiency.

Bright Spots

The picture is not as bleak as some of the foregoing may imply. There are a number of bright spots which have or will have a positive impact on soldier effectiveness and training base efficiency.

The first and probably most significant of these has been the development of EPMS. In June 1973, the Chief of Staff of the Army directed that a major review be conducted of the Army's system for enlisted professional development. MILPERCEN and TRADOC were tasked to mold jointly existing programs of training, evaluation, classification, and promotion into an overall, integrated system. The primary aspect which affects individual training is that, although the Army's promotion system remained generally the same, there is now an additional prerequisite for promotion. Before a soldier is eligible to compete for promotion, he must demonstrate a specified level of skill. To do this requires linking the training system by which a soldier acquires skills, and the evaluation system by which those skills are measured, into the promotion system. This is a very key point in determining the "how and where" of future training. The Army now truly "owes" the soldier quality training whether it be at the entry level, sustainment training in the unit, or training at any one of four levels of the Noncommissioned Officer Education System (NCOES). For those who are unable to attend certain levels of NCOES, the Army "owes" the soldier quality on-the-job training (OJT) and sustainment training in the unit so he may compete for promotion.

EPMS has four primary objectives, all of which are either affected by or affect training to some degree:

a. Provide a logical and visible roadmap guiding soldiers by the most direct route from E1 to E9 by redesigning each career management field.

b. Eliminate promotion bottlenecks and afford promotion opportunity to all enlisted men and women.

c. Provide continuing training throughout the soldier's career.

d. Broaden soldier skills, make assignments more flexible, and provide greater challenge by decreasing the number of MOSs through elimination/combination at the lower grades and additional MOS merging at higher grades. Each CMF is analyzed individually considering these objectives.

In EPMS the Army has developed a sound method for managing career progression, professional development, and promotion opportunity. The key to each is quality education and training.[38]

Without a doubt, one of the most promising improvements on the horizon is the Master Plan for Enlisted Systems (MAPES). The cornerstone of this system lies in the CAP IV Task Force Report, completed in June 1977. This report is a complete examination of the relationships of all aspects of the enlisted personnel management system, to include a review of the principle functional locations and associated ADP systems. Although there are a number of problems and recommendations included in the report, three major ones impacting on training management and mobilization emerged:

a. The current enlisted personnel system will not support full mobilization--this capability must be built into the peacetime automated system.

b. The current system, to be cost-effective, is too small (file size, processor time, etc.). Excess capacity must be readily available to allow rapid and flexible response in time of national emergency.

c. The Enlisted Personnel System(s) individually developed were frequently divergent in both philosophy and software development. Resources have been wasted on parallel and sometimes perpendicular development.

As a result of the CAP IV study, it was recommended that the MAPES concept be institutionalized and controlled by a full-time design review board.[39]

It may be that no single initiative is more important in reducing training-related personnel system inadequacies than the implementation of MAPES. Its potential impact on the coordinated management of training space, training assignments, distribution, mobilization planning, reenlistments, and MOS inventory control to name a few, is extremely positive. This project must be resourced to succeed.

Another initiative, known as the AIT Attrition Study, will result in an analysis of selected AIT classes to obtain information regarding attrition, a main contributor to turbulence. Although currently designed as a one-time manual effort to meet current analytical needs, it is visualized

that future efforts to capture training base attrition data will emanate from either the TRADOC Educational Data System (TREDS), or one of the systems within MAPES, such as REQUEST. Once the capability is developed to define attrition factors thoroughly, the Army will be able to be more selective and efficient in assigning individuals to the appropriate training, thus reducing attrition and associated turbulence.

At the same time, development of the Enlisted Training Accession Management System (ETAMS) should be revitalized. Plans to test the ETAMS concept have been completed but are not yet approved. Additionally, the potential of the system has been reduced. Current plans will permit management of racial mix by MOS as well as establishment of MOS priority based on yearly training program shortfall and "urgency" (seats remaining in a specific class). However, the system has more potential for controlling course/class input by various measures of quality. Through the use of aptitude scores, possibly related to mental category, "quality fences" can be established in REQUEST. By limiting input based on quality groupings, attrition could be reduced and career force aptitude by MOS could be controlled.

In a time of reduced quality, quantity, and high attrition, it is vitally important to develop additional discriminators and management tools for ensuring that soldiers are enlisted for and trained in the right skills.

Another area of noteworthy progress concerns skills which are space-imbalanced (currently 52 MOS). In the past, there has been a significant loss of PMOS proficiency as a result of the limited ability to assign soldiers to CONUS duty positions that are related to primary, space-imbalanced MOSs. Consequently, overseas units received replacement soldiers who had been forced to serve outside their PMOS during their previous CONUS assignment. These individuals were prone to score poorly on skill qualification tests and had difficulty remaining competitive for promotion and school selection. In many cases, the overseas commander was required to spend excessive time retraining these soldiers to reestablish PMOS proficiency. Moreover, morale of affected enlisted soldiers suffered when they had to spend the majority of their service careers overseas.

Due to these and other related problems, the Enlisted Space Imbalanced MOS (SIMOS) Program (DA Cir 611-40) was implemented. To date, six Hawk-related MOSs are included in this program. Currently, 16D and 16E personnel who have been away from the job for two years or more are being cycled through modified MOS courses. The remaining MOSs (24C, G, K, & L) are not being retrained because these soldiers can be used in their MOSs both in CONUS and overseas. The next imbalanced MOS to be activated will be Pershing. In the meantime, TRADOC has been asked to identify current courses applicable to SIMOS, new courses to be established, and existing nonresident instruction and/or exportable packets applicable to

SIMOS. Although on-the-job training/experience and nonresident instruction may be used to satisfy some of the requirements, in most cases to avoid excessive retraining in the field, personnel will be selected for formal resident training in conjunction with a permanent change of station.[40]

The last area of improvement to be addressed is interservice training. Although great progress has been made, comparable strides may be more difficult in the future. The Interservice Training Review Organization was established in 1972 to improve training cost-effectiveness by consolidating and collocating resident training courses as well as to exchange technology, standardize procedures, improve nonresident programs, and establish joint manuals. Since its establishment, 184 courses have been consolidated, with an annual recurring savings of approximately $6 million. However, as resources become more scarce, need for consolidation and collocation will grow. Primary emphasis must be placed on interservice and intraservice training where greater levels of efficiency can be achieved by reducing the number of training installations and by consolidating common Service courses of instruction. Unfortunately, most of the easy decisions have been made and future mergers will require both an elimination of growing parochial concerns and careful management of sensitive political issues involving such actions as base closures.[41]

The Recruiting Environment

A discussion of the training environment would not be complete without considering the man and the marketplace. The volunteer Army, controversial since its establishment, is moving into a critical period in which its cost, military effectiveness, and racial composition are seriously challenged by those who support systems such as the draft or Reserve-only draft for filling the ranks, as well as other forms of "national service" conscription. Studies abound concerning the All-Volunteer Force (AVF) and motivations toward enlistment. The ultimate question is always, Will the AVF continue to work for the Army? The scope of this research does not permit an answer to that question although it, among others, is being addressed in a separate DOD study. However, some consideration must be given to the future recruiting market as it impacts on individual training. Questions to be asked by the trainer should be, Will the Army recruit the requisite numbers to train? and, What will be the quality?

Perhaps the most important conclusion to emerge from the first 5 years of experience without the draft (i.e., since January 1973) is that the volunteer force, at least quantitatively, has worked. With the exception of modest recruiting shortfalls in the first year of the AVF, and again during the summer of 1976, the Army has successfully met its quantitative recruiting objectives since removal of the draft. This does not mean that there should be no concern, for the population of males between the ages of 17-21 is steadily declining from approximately 10.8 million in that age group last year, to a projected 8 million in the 1990's. The point

is approaching where the Army must either reduce accession requirements, accept reduced quality, or spend significantly more on recruiting. Recruiting from this smaller population will be difficult, particularly if a reduced recruiter force, marginally funded, must compete with improved economic conditions in the civilian sector and very visible reductions of Service benefits.

A detailed analysis of the recruiting market which measured attitudes and motivations with respect to enlistment in the Army determined that the top motivations to enlistment are training for a civilian job, an opportunity to decide what to do later in life, personal growth and maturing, opportunities to travel, and a chance to obtain college-type schooling. One-third or more of those polled selected these issues as "most important" attractions to enlistment in the Army.[42] Training has been a top motivator consistently. In order to remain credible in "home town USA," the Army must provide the best.

Training for a civilian job does create certain recruiting problems, however, in that a majority of annual nonprior service accessions cannot be recruited for, and trained in, skills easily transferable to the civilian job market. Other motivators must then be applied.

Conversely, those jobs which are related to a civilian skill and are the easiest for recruiters to "sell" normally create the greatest training inefficiency. This is because many technical skills (ADP, medical, mechanical) are more expensive and time consuming to train, while they are also among the most difficult in which to retain soldiers due to better paying civilian jobs. This results in a loss of both force effectiveness and efficiency due to the constant requirement to recruit and train replacements.

An important factor with regard to quantity and the future market is that the Army should be able to reduce annual accession requirements and thus continue to meet quantitative goals. The nonprior service (NPS) male accession requirement for FY 1978 is 140,000 and may decrease. This is the lowest male requirement since the volunteer Army began and is approximately 13,000 fewer than the number of NPS males recruited in FY 1977. The male NPS high school diploma graduate (HSDG) goal for FY 1978 is 95,000. Assuming achievement of this goal, USAREC must recruit only 45,000 male nonhigh school diploma graduates (NHSDG) compared to approximately 67,000 recruited in FY 1977. The reduced requirement for nonhigh school graduates in FY 1978 permits the Army to deny enlistment to some categories of male nondiploma graduates who have the highest training attrition.[43]

In the Reserve Components, the problem of quantity is not nearly as clear-cut as it is with the Active Army. The strength of both the USAR and the ARNG continues to drop and many RC units must devote their total efforts to recruiting, at the expense of training.

Without inducement of the draft or major financial incentive, it is proving to be quite difficult to induce a young person to join an RC unit. Furthermore, the present system calls for new enlistees to attend basic training (BT), AIT, and frequently follow-on training during one consecutive period. Young people who have successfully completed high school usually have plans for either college or a civilian occupation and are not willing to take a period of four to six months to attend training. One potential solution to this problem (split BT-AIT) will be discussed later.

It appears that the Active Army can recruit the requisite numbers even though forced to rely heavily on a regional focus to achieve HSG content. On the other hand there is valid concern over quality, attrition, and trainability even though attrition trends remain favorable. Studies have shown that recruits who cost the Army the least and contribute the most to readiness are those who stay for a full term of enlistment. A comprehensive analysis of the attrition associated with the various categories of individuals the Army enlists shows that the more education a recruit has, the less likely he is to leave. Specifically, the high school diploma is the single best indicator for predicting a recruit's probability of completing both training and a full term of service. For example, a male Mental Group Category IV high school diploma graduate is a statistically better risk than a Mental Group Category I-IIIa nondiploma graduate. Also within education levels, mental group category (MG) is an indicator of attrition risk (the higher the MG, the lower the risk). Age is a discriminator; in particular, male nondiploma graduates MG IIIb under the age of 18 and over the age of 22 are high attrition risks. The number of male non-diploma graduates MG IIIb under 18 years of age more than doubled from FY 1974/75 to FY 1976/77.

Army attrition analysis also reveals that females have a substantially greater attrition risk than males of the same education level and/or MG. For example, nonprior service females with a General Education Development (GED) certificate have twice the attrition rate of MG I-IIIa diploma graduates, and they have the highest attrition rate of any nonprior service group (male or female). Also, MG I-IIIa female nonprior service (NPS) diploma graduates have the highest attrition rate of any NPS diploma graduate category, even higher than male nondiploma graduate MG IV.[44]

In the future, the Army must do more than just rely on decreasing NPS requirements. Such may be satisfactory today, but it will not be tomorrow if accession requirements escalate or if there are war-driven manpower requirements. Nor will reduction in accession requirements address the problem of accession quality over the long term.

Even though the Army has, to date, generally accepted certain yardsticks (HSG, mental group, age, sex) as a measure of quality, and therefore of training and retention success, more consideration should be

given to reevaluating those standards as well as correlating and infusing others. This is particularly important in view of recent concern over attrition and its associated cost as well as the Army's need to ensure that soldiers are task/job proficient.

One area for review should be physical standards. Chu and Norrblom estimate that U.S. physical standards for enlistment could be modestly relaxed in nine different areas without adversely affecting force capabilities or manpower costs. This relaxation would increase the number of qualified enlistment applicants by 5 to 10 percent, which would help eliminate the mid-1980's projected recruiting deficit, even if accession requirements are not reduced. The real payoff to such a relaxation, however, would come from the 5 to 10 percent increase in the supply of Categories I-III high school graduate enlistments.[45]

The fact that medical standards have been established and waivers granted may not be enough. In tomorrow's market the Army should be ready to modify selectively certain physical standards in order to maintain quality.

In addition to physical standards, a discussion of quality must include brief consideration of the current measures of aptitude, specifically the Armed Services Vocational Aptitude Battery (ASVAB). The obvious question is, does the ASVAB measure trainability or training success? Although not completely validated, the preliminary answer is yes. This is based on the fact that the ASVAB parallels very closely the Army Classification Battery (ACB) 73, which was thoroughly validated. Experiments involving the ACB were administered to approximately 25,000 soldiers across a wide spectrum of skills. These personnel came from a variety of backgrounds representative of Army accessions and were evaluated against both performance in training courses and in subsequent duty assignments.

Because the ACB/aptitude area system was found to be an accurate predictor of aptitude, interest, and trainability, it formed the basis for ASVAB development. At this point in ASVAB validation there is no reason to believe that the relationship between ASVAB and training success will be significantly different than the relationship between ACB and training success.

Current plans for ASVAB validation by the Army Research Institute call for it to be conducted in two phases. Phase I will correlate current aptitude areas with training grades. This phase is currently in progress, with initial input expected during mid-CY 1978. Phase II will develop the best possible mix of aptitude areas. This phase is estimated to be completed in late CY 1978.

Another area of frequent concern involves the specificity of ACB/ASVAB. In other words, could training success be more assured if

the Army had a wider variety of more specific tests? It has been determined objectively that many jobs require similar aptitudes--the same human abilities and interests. As a result, many aptitude areas overlap and preclude test developers from being overly specific. In the case of the ACB and ASVAB, nine has been determined the optimum number of aptitude area composites which cover all abilities and interests. However, in this regard it is critical that aptitude research include the means for measuring the ability of soldiers to be cross-trained or rapidly "trained up" to new or different equipment, particularly considering a lower quality market and a significantly more complex battlefield environment.

The future of the ASVAB, as well as of additional aptitude measurement, is reasonably bright. First of all, there is today the capability to test and evaluate aptitude areas against a three-digit MOS. This enables the Army to relate trainability to MOS rather than to the nine MOS groupings, if desired. Additionally, future tests will analyze ASVAB validity for women as well as minority racial groups with the goal of eliminating all possible biases. Further in the future is adaptive testing--individually tailored tests which will decrease the length of testing, while maintaining current reliability. Adaptive testing also has the potential to decrease compromise due to the wide variety of questions and tests available, as well as eliminate much of the administration involved in current testing. The major disadvantage is the cost of computer hardware and software. However, this could be spread over other functions such as vocational counseling (probability of soldier success in a variety of jobs or situations) and automation of AFEES administration.[46]

A final area which must be addressed in light of future quality is the acceptability and trainability of lower mental categories. The rationale for restricting marginally acceptable enlistments is based on: job performance, trainability, and the potential for disciplinary and motivational problems. Of the above, trainability has been the easiest to measure; however, studies do not provide conclusive evidence. For example, one study conducted for the Gates Commission indicated that approximately twice as many Category IV personnel require help during basic training as do those in Category I-III. Attrition rates were also found to be approximately twice as high in entry level skill training (10 percent versus 5 percent).

With regard to job performance, there is one set of data that indicates Category IV personnel are approximately 10 percent less productive than their Category I-III counterparts.[47]

However, there are other data which indicate favorable comparisons. A number of studies show that, when compared with other categories in the BT environment, Category IV enlistees expressed more favorable attitudes toward the Army, were rated by their peers as having only slightly less aptitude for leadership, and were no more often objects of administrative

and disciplinary action. Beyond BT, findings indicate that job performance has been quite comparable to control groups of Category III personnel.[48] An evaluation of "Project 100,000" personnel showed that, although less literate than their contemporaries, most were able to meet end-of-course criteria. Data supports the fact that these personnel were just as acceptable as their peers in upper mental categories when confronted with jobs which required high practical performance content rather than high reading requirements.[49] With regard to the latter, one initiative that has recently been taken should help in answering the criticism as to the reading ability of current enlistees. Each year approximately six percent of all soldiers who enter the Army read below a fifth grade level. These soldiers form a large segment of the Army's disciplinary and motivational losses. Future plans based on agreements between the Department of Defense, Department of Labor, and Department of Health, Education, and Welfare will involve testing and reading training for individuals before they enter the Service.[50]

In another study involving lower mental categories, four MOSs (Armor crewman, general vehicle repairman, unit and organizational supply specialist, and cook) were selected for comparing the performance and characteristics of marginal soldiers with groups from upper aptitude levels. Approximately 375 men were studied in each MOS. Information about job effectiveness was obtained through job sample tests, job knowledge tests, and supervisor ratings. Job performance, as measured by job sample test scores, was directly related to both AFQT and job experience. The data suggest the potential loss of a sizable number of good performers if men with Armed Forces Qualification Test (AFQT) scores below 20 are excluded from the Service. Thirty-three percent of the men in this group with 1-18 months of job experience performed above the median, whereas 25 percent of the 65-99 AFQT group scored below the median. Fifty percent of the 0-20 AFQT group with 19-30 months of job experience and 85 percent with more than 30 months of job experience scored above this same median. It was also determined that beyond 30 months of job experience, there is a clear and stable floor of performance. This floor could be used to define minimum acceptable performance. Based upon the results of this study, the primary implication is that the Army could accept men at lower AFQT levels for some jobs.[51]

Considering current training trends (i.e., training only essential tasks, using easy to read manuals (ITDT), and emphasis on hands-on-performance) reevaluation of the suitability of lower mental categories for selected skills may be appropriate. While there are Category IV personnel who lack the aptitude necessary to perform MOS duties satisfactorily, apparently there are those who are capable with respect to both training and job performance. Such soldiers can be useful to the Army in a number of MOSs, some of which represent major portions of total Army manpower.

On the other hand, the modern battlefield will place severe demands on individual soldiers particularly from the standpoint of such requirements

as cross-training or rapid "train-up" to new or different equipment. Much of the research data cited above predates consideration of these factors. There is a pressing need for further study of measuring the capability of lower mental category personnel against the proficiency requirements, conditions, and standards of the current battlefield.

CHAPTER III

TRAINING: TODAY AND TOMORROW

The preceding has dealt primarily with the individual training environment as influenced by various pressures, policies, and systems. With these factors in mind, this chapter examines individual training philosophy as well as future training alternatives which should be considered as a result of the environment.

Philosophy

Prior to the seventies, Army training was based primarily on a lecture/demonstration practice method, and use of written and performance tests of a normative nature for evaluation. In addition, as with the other Services, a great deal of empnasis was placed on improving overall literacy, and courses were generally developed based on time in training (course length). Instruction normally occurred within the conventional classroom structure in an instructor-centered, group-paced mode with extensive use made of traditional audio-visual media (films, slides, transparencies, chalkboards, and flip charts).

Changes to these methods were primarily brought about by three major events. First, increased United States involvement in Vietnam; second, increased pressure from minority and "disadvantaged" groups for governmental actions to improve employability; and third, the decision to discontinue the draft in favor of a volunteer force. The first two events are very important in that they tended to increase the Army's size and lower entry qualifications, with a resultant impact on retainability, proficiency, and effectiveness. The traditional instructional system, which relied to a considerable extent on verbal presentation and the use of written materials for both instruction and evaluation, was not very effective with lower mental ability personnel. Thus, research was initiated to determine more efficient and effective ways of training the variety of personnel entering the Army, with special attention to those of lower ability.

The literacy remedial programs of all the Services were initiated primarily because of these same pressures. Further, the Army's existing program for literacy skill development grew out of the same research and

development base that had fostered performance-oriented training. In accomplishing this, a multifaceted approach was taken--determining the literacy requirements of jobs, determining reading ability of actual and potential job incumbents, and developing a functional literacy program aimed at meeting job-reading demands.

The program developed for the Army differs from its predecessor and from programs in the other Services in two major ways. First, it emphasizes job-functional literacy instead of general literacy and, second, it occurs at the end of basic training rather than before recruit training begins. The same principles employed in performance-based training are incorporated into this program.[52]

In the fall of 1970, the Special Assistant to the Chief of Staff for the Modern Volunteer Army (SAMVA) undertook a long-range plan for conversion to the All-Volunteer Army. This called for extensive innovation in the areas of recruiting, life style, and training. For training, this involved developing and implementing the Experimental Volunteer Army Training Program (EVATP). With HumRRO's assistance, a number of established learning principles were derived and incorporated into an instructional system designed to train men with widely different learning aptitudes. These original principles formed the groundwork for the Army's current training philosophy. Application of these principles meant:

a. Emphasis shift from familiarization and orientation to training that ensures performance of high priority combat tasks.

b. Shift from standard written performance tests using 70 percent normative criterion to random performance testing using the "Go" or "No Go" criterion.

c. Replacement of lecture-demonstration-practice by performance training, emphasizing hands-on practice.

d. Replacement of lock-step instruction techniques by self-pacing as much as possible.

e. Instructor reorientation from simply presenting information to demonstrating skills, organizing practice, and providing immediate feedback on skill acquisition.

f. Replacement of tests at the end of BT with checks immediately after instruction, during the course, and at the end of the course.[53]

Despite early discovery of EVATP principles, the watershed of current Army training philosophy can be traced to a commander's conference held at HQ, US Army Training and Doctrine Command in December 1975. It was here that the TRADOC training strategy was first articulated in total. Many innovations, such as OSUT, self-pacing, exportable training, and

combat developments, had been implemented to some degree. However, it was at this meeting that the training community was first molded into a cohesive group with a common training philosophy and training development goals.[54] The cornerstone of this philosophy is based on the five foundations that make up the Army training strategy:

a. The system focuses on the forces in the field, and increased proficiency of soldiers on the job.

b. The service school is the proponent for the life cycle of "the system" (MOS, weapons, unit).

c. The service school is responsible for total systems development (training, as well as input to the personnel and logistics subsystem).

d. Job-based focus is on the specifics of the duty positions soldiers hold.

e. Accountability is based on feedback and responsibility.

This strategy is founded on the trainers ultimate goal of supporting readiness by developing doctrine, analyzing training, and systems engineering critical tasks and missions. All of this is supported by sound training technology, which is being exported to the field in ever-increasing quantity. From the evolutionary development of this philosophy and its related strategies have come a significant number of initiatives such as one station unit training (OSUT), integrated technical documentation and training (ITDT), simulation, and exportable training packages, to name a few, which have enhanced efficiency and effectiveness of the training base as well as improved the ability of the field to conduct quality individual training.

How, What, Where?

The primary purpose of all military training, however or wherever it is conducted, is to provide the trained manpower capable of executing missions and suceeding in combat.

In today's Army, individual training, in its contribution to this goal, has several variables. In determining what should be trained, how it is to be accomplished, and where it is best conducted, a number of factors other than the philosophy and environmental influences previously discussed should be considered.

Basic Training

Leading to the ultimate goal of training soldiers who can contribute to combat effectiveness--win the battles--soldiers must be disciplined and socialized. With this in mind, the first consideration is how to

convert the young enlistee from citizen to soldier--what does and should the process involve?

An individual entering upon an initial enlistment is provided recruit training, commonly referred to as basic training, that introduces him or her to military life. Following this indoctrination, an individual will follow one of three possible avenues: initial skill training, which prepares the enlistee for an initial duty assignment; direct duty assignment on the basis of a skill already acquired in civilian life; or direct assignment to a unit for OJT.

The one station unit training (OSUT) program is something of an exexception to these three avenues, since it combines recruit and initial skill training into a single course, followed by assignment to an operational unit. About 21 percent of Active Army nonprior service enlistees will be trained under the OSUT program in FY 1978.[55]

Even though the Army has been very active during the past few years in introducing new approaches to recruit training, it has frequently come under attack. Normally, criticism is focused on the length of training, which is related directly to efficiency and cost savings with little regard to the effectiveness of the training. It is acknowledged that the length of the training cycle is an important factor in determining the cost of recruit training. In fact, reducing length has resulted in more efficient inprocessing and/or elimination of less important subjects. However, other less palatable alternatives, such as reducing training attrition, reducing loads by recruiting more prior service personnel who require little or no recruit training, and decreasing the number of students by increasing active duty term of service, are frequently espoused

While recognizing that training efficiency is a very important and desirable objective, it cannot be the primary goal. That, by necessity, must be effectiveness. To achieve effectiveness, recruit training must accomplish some basic things--not much different than stated in 1934 by then-Major Omar Bradley:

> "A soldier must learn certain fundamentals, such as how to use a weapon, obey commands and function as a member of a team. The training necessary to fit a recruit for duty as a replacement need only be such as to enable him to acquire the fundamentals of <u>one job only</u>, and to develop that measure of skill in it which will permit him to function as a replacement without seriously decreasing unit efficiency. Two things are essential; sufficient instruction in the fundamentals of his job and physical fitness."[56]

This description of what recruit training must accomplish is very similar

to the modern day requirement voiced by General DePuy in 1975, "The objective of basic (combat) training is to begin the conversion of the trainee from a civilian to a soldier and to teach the trainee discipline, spirit, and certain basic combat skills while toughening him mentally and physically."[57]

A review of recruit training since WWII shows that the length and content of BT has changed continually based on the Army's wartime experiences (WWII, Korea, Vietnam), its peacetime needs and, more recently, analysis of the Mideast War. This experiential learning is reflected not so much in course length, which was approximately eight weeks until 1973, when seven weeks became the norm, but in course content. As an example, nuclear-biological-chemical (NBC) training received heavy emphasis during WWII, but shortly thereafter was deemphasized. Today, the NBC threat environment has led to a dramatic increase in emphasis on that training within the BT course of instruction (COI). Individual tactical training has become a greater part of BT since the Mideast War demonstrated the increased lethality and fluid nature of the modern battlefield. We now recognize that all soldiers, regardless of MOS, need some tactical training. The point is, BT has not reached its current state by a haphazard evolution but through analytical development that has been validated by wartime experience.

This does not mean that efficiencies are impossible, but rather that course length reductions are difficult to analyze in quantitative terms. They may, with current laws, delay initial overseas assignments until the trainee has spent the required amount of time (currently 12 weeks) in training. They also reduce the time available for a recruit to adapt to military life, as well as the time available to evaluate a new recruit and to decide whether marginal ones should be retained or released. Finally, reduced length may lead to higher attrition due to the increased pace of training and lack of time for unit leaders to counsel and develop potential dropouts.

Other than keying on the time required to socialize and instill discipline, there are several approaches to reducing selected BT activities. One involves either eliminating entirely the time spent on certain activities, or reducing Service-common activities to the minimum devoted by any one Service. Another approach is to review programs frequently to determine whether the knowledge or skill is required during a soldier's first enlistment and, if so, whether the recruit training environment is the best place to teach the skill.[58]

There are several other possibilities with regard to increasing basic training efficiency. One involves reducing the number of basic training installations. Due to congressional manpower reductions and increased OSUT training, TRADOC will have eliminated two BT stations--Fort Bliss and Fort Gordon--by FY 1979. This would reduce TRADOC to six BT centers. If Fort Dix could be closed or transferred, TRADOC would be able to reduce BT

to five locations. However, moving any more BT sites without base closures would not be cost-effective. Although the gaining installation would become more efficient, the losing installation would be less efficient. Until the Army has time to work out these difficulties, the current reduction to six installations appears to be the most cost-effective organization.[59]

Other possibilities, in addition to those proposed in response to DPS 040, and increased OSUT, include evaluation of daily starts for OSUT and more frequent evaluation of COI to identify areas of potential reduction, such as increased self-pacing.

Even though the Army has used analysis and experience to arrive at the current 7-week BT COI as the standard for turning a civilian into a soldier, there is another consideration which should be taken into account in light of ever-constrained resources and the possibility of future DPS 040 "type" actions. This is the possibility that basic training might well become more of a focused discipline and socialization process as opposed to a socialization-training experience.

First, however, the Army must define socialization and the degree expected of a basic training graduate. What are the indicators? What makes one soldier disciplined and another undisciplined? Until this is done, it is difficult, if not impossible, to define and measure this process. Socialization does not imply that training would not be accomplished during the period. However, it would be limited by the amount of time required to produce a loyal, disciplined soldier. This period would form the framework on which to structure future basic training.

There has been considerable work done on the socialization process and the creation of the "organization man." However, it is mostly subjective, in that the acquisition of beliefs, customs, habits, and even information and technology is a lifelong process, and for each role change some socialization occurs. There have been a number of attitudinal studies conducted which could form a basis for direction.

One of these was administered to more than 800 trainees in the first and last weeks of basic training. Although the major purpose was to measure soldier expectations and attitudes, both pre-training and post-training, some interesting results were obtained which could be applicable to the question of "time to socialize." First of all, 63 percent of the pre-training men indicated that they thought it would be hard for them to adjust to military life, but only 4 out of 10 men (39 percent) reported that they had more than slight difficulties in adjusting. About half of the pre-training group (52 percent) anticipated difficulty in adjusting to discipline, while only 37 percent of the post-training group experienced even moderate difficulty. Many of the pre-training soldiers had anticipated psychological or emotional problems but fewer post-trainees experienced such difficulties. In general, the adjustment from civilian to

military life was found to be easier than expected.[60]

Although the application of these types of findings which date from the immediate post-Vietnam period to the more stringent standards of current training is unconfirmed, they may provide a basis for reducing course length if discipline and socialialization, once defined, were to become the major objectives of basic training. Additionally, since it appears that little or no data is available in the Army on which to base a definition or measurement, consideration might be given to developing an experimental design for a modified BT COI. It could be based on guidelines drawn from socialization programs in other occupational areas as well as focusing on the reasons that soldiers leave the Service. Sample groups of recruits could be randomly assigned to both modified and standard BT. By comparing such factors as attrition, adjustment, job success, promotion, and even reenlistment between the two groups, success in terms of efficiency and effectiveness of a "socialization-oriented" program could be determined.[61]

Beyond "Basic"

However, basic training is just the first step. It is followed by initial skill training--that which enables a soldier to perform his job and ultimately function as an effective member of a team. This training provides a commander with the collection of skills which enables the unit to win battles and provides the soldier with knowledge that can be used within the Army or subsequent to military service. Recall that the Army is operating in a new environment--a very competitive marketplace where one of the primary concerns of a potential enlistee is what training he will receive, particularly as it may relate to a future civilian occupation. This creates a situation that the Army did not have to face during the days of the "free" draft, or even during the early years of the all volunteer force when the market was relatively large.

Now, in selecting or evaluating the "what, how, and where" of training, it is imperative that in addition to systems engineering, two basic guarantees be considered. The first and most obvious is to the Army or the unit. The second guarantee is to the soldier. It is one that goes beyond that of the enlistment contract--it continues throughout a soldier's service and includes quality training--a perceived right. As previously mentioned, the most important end product of training is a combat-effective soldier, able to master both environment and equipment. In the past, the Army has not always provided this "guaranteed product" to the unit commander.

This problem is both real and perceived. Soldiers have, in some instances, been poorly taught, while others have not learned but went on to units anyway. Some soldiers were purposely not taught certain skills (a function of systems engineering and critical task analysis). This has, on occasion, been the root of considerable misunderstanding between trainers

and the field. Regardless of whether a soldier leaves BT and goes on to AIT or directly to a unit, as in the case of Stripes for Skills, OJT, or AIT in units (AIU), he must leave the training base with the requisite skills to contribute to the team effort. He must know what is expected of him in understandable critical tasks. The training system must help him do this so the guarantee to the unit will be met. It can be done through good, job-related training, and technology. However, this training may in some cases need to be even more specialized than it is today. This is important not only because of economies required but because non-essential tasks can detract from a young person's ability to retain more important ones.

Previous discussion has generally established the need for specific job-related training, and tests have shown that new training methodologies result in greater individual proficiency as well as training base economies. However, improvements to currently perceived "good" programs must continue. For example, the recent Tank Force Management Study determined that Armor OSUT graduates, products of one of the Army's most innovative training procedures, were not specialized enough. Rather, they were still essentially generalists who could not perform in one skill well. As a result, the Army is converting to two instructional tracks by a discrete armor system, so that a more effective soldier can be provided to the unit.[62] However, as the Army moves toward more specialized training, it must recognize the increased inflexibility with regard to rapid cross-training in a high casualty environment.

There are other considerations as to the "how and what," such as, How does the soldier maintain individual proficiency after the formal phase of training has been completed? The obvious aid is the soldier's manual, but it should probably go beyond that--more defined, with priorities spelled out, and include standard essential tasks: an annotated soldier's manual. These would provide the basis for developing individual training programs in the unit and include much of the information that supervisors need for the preparation and conduct of better individual training, thus assuring a continued "guarantee" for both the unit and the individual. Also worthy of expansion, and currently being examined by ARTS, is the work that the Army Training Board has done with the soldier's manual-ARTEP interface. With ever-increasing demands on time, trainers must exploit common task integration at every opportunity. It is becoming more important that priority individual tasks be identified with particular collective tasks, and that emphasis be directed toward training specific SM tasks as part of collective training. The participation of soldiers in well-planned collective training can be far more than "going through the motions"; such training will greatly benefit individual proficiency. In all cases, individual sustainment training should be measured by frequent task tests, preferably conducted on a random, no-notice basis.[63]

Before addressing the very crucial and contemporary issue of where training might be conducted, it is appropriate to elaborate briefly on both

the personal training guarantee the Army "owes" the enlistee and that which it will be called upon to provide as the recruiting market changes.

Anything which changes the training system as it impacts on the personnel system, or the personnel system as it affects the training system, must not lessen the Army's ability to recruit quality enlistees.

If the Army is to stay competitive in the volunteer market, it must continue to provide, and probably increase, personal guarantees to the soldier. Personnel systems should be more responsive to the needs of the individual as he seeks self-improvement. He must be provided decent housing, a living wage, adequate medical care, job satisfaction, recognition, and most of all, the opportunity to improve himself or herself through promotion, education, and training. With respect to the latter, this means quality initial skill training, guaranteed not only by an enlistment contract but by the trainer, whether it be the institution or the unit. The guarantee should be backed up by continuous sustainment training, surveys, tests, inspections, and feedback. Without these, soldiers' expectations for advancement, responsibility, and promotion will not be met, and these will inevitably be counterproductive influences on recruiting, retention, turbulence, and combat effectiveness.

Alternatives

Previous discussion has primarily been limited to the "hows" (instructional systems development, CRI, self-pacing, simulation, exportable training) as well as the "whats" (critical, job-oriented tasks). The following deals with the issue of where training might be conducted. For the future, and as part of the ARTS TEA effort, tests have been developed to determine which common skills must be taught in institutions and which can adequately be taught in units without adversely effecting readiness. Additional tests will determine proficiency decay over time of critical skills which should also influence site selection. Data will be analyzed to assess an optimal mix of training to be conducted in the institution and the field. These tests as well as the Battalion Training/Cost Survey may well form the foundation for development of school COI, unit individual training programs, and resource allocation. However, until this effort fully materializes, interim alternatives should be considered.

Prior to World War II, training of soldiers was generally accomplished in each Regular Army Regiment by the officers and NCOs. However, the significant increase in the training load caused by World War II ended the regimental training system and resulted in the formation and use of Army training centers. This mobilization-based training system has been virtually unchanged since that time. There are some very persuasive arguments against the current training system from both inside and outside the Army, aside from the fact that the Army is constantly defending itself against the advocates of "cheaper" training.

One of these arguments centers around three factors: the changing nature of contemporary war, current US military strategy, and advances in learning theory that question the traditional training methods. Wars of the future will most likely resemble limited conflicts, rather than total war of the World War II type. As a result of the nuclear threat, they may be violent and short, eliminating the need for long mobilization periods. This scenario mitigates against the current mobilization training capability in favor of standing forces. The quick and deadly battlefield of the future will require trained, proficient units, stategically positioned.

The second factor centers upon the Nation's relatively consistent strategy of containment, assistance to allies, and trained, prepositioned conventional forces which can react to various contingencies. These forces must remain in a high state of readiness and not rely on a large, expensive, mobilization-based training system which probably could not react quickly enough to produce effective soldiers in the case of a fast war. Finally, there is some concern that the institutional approach "overtrains" the soldier because it prepares him for many different tasks in a variety of assignments, whereas a decentralized system could concentrate on specific job requirements.[64] This argument, though true in the past, is only partially valid today. There is probably some overlearning, in that each trainee cannot, using the present system, be identified with a specific job in a particular unit. However, the institutional training system has made considerable progress away from broad-based, orientation-type training. It has analyzed tasks and developed training strategies which permit the soldier to transfer most institutionally learned skills directly to the job.

This does not mean that a soldier trained in the decentralized unit environment would not receive training even more specifically job-related, nor be more motivated to learn in the environment in which he lives. Initially, he also might retain slightly more skills since it has been shown that considerable knowledge is lost between the end of institutional training and the first unit of assignment.[65] But these are all negated, or at least minimized, if quality training cannot be provided. The questions now become: Where can quality training occur consistent with readiness requirements? How will it be done? Can the decentralized system provide quality training so necessary in today's equipment-intensive Army? Will training in a unit be more than merely assigning an individual to a job and requiring him to learn the necessary job skills on his own?

In general, there are three basic strategies involved in the "where" part of the training equation. All training could be conducted in the institution before assignment to an operational unit. Alternatively, it could all be conducted in the unit, or the Army could conduct training in the institution for certain critical tasks that could not be taught in units, and train the remainder of the tasks in the unit.

It is no longer acceptable merely to say that the foundation of Army training philosophy is grounded in the institution. If this is true, the Army must demonstrate in fairly dramatic ways that institutional training, at least as a foundation, is both efficient and effective. To do this convincingly, it should structure, test, and document alternative training methods.

With this in mind, what are some alternative training strategies that could be employed and how effective might they be?

The first and probably the most common is AIU. This has traditionally included specialized skill training in a unit following BT in the institution. This method of training, both in a train and retain mode, and a train and pass mode, has been used on a number of occasions with varying degrees of success. The most recent large-scale AIU program other than the Reserve Enlistment Program Training (REPTRAIN), in which Active Army units trained RC, nonprior service personnel, was conducted between 1971 and 1974. This program was initiated when the Chief of Staff of the Army directed in July 1971 that token AIT be conducted in units during FY 1972 to develop the machinery and expertise so that this option could be pursued should manpower constraints dictate.

AIT in units was initiated on 1 November 1971, using CONUS unit-of-choice (UOC) enlistees in six combat arms skills, in seven units. It was expanded in January 1972 to 12 CONUS units. In July 1973, 14 additional skills were added to the program. However, by late FY 1973 units began to ask for release from the program, and by FY 1974 only nine units desired to continue conducting AIT in units. Forces Command and the 25th Infantry Division soon requested termination of the program for all units, which during the period trained approximately 40-45,000 enlistees.

The advantages of AIT in units are generally:

a. It allows the allocation of fewer resources to individual training activities. The reduction in student strength is important since student pay and support costs make up much of total training costs.

b. AIU/OJT students can be used in performing limited tasks in operational units while still training.

c. The concept, in a train and retain mode, capitalizes on unit esprit, early unit identification by the individual, and meets specific unit job needs.

d. During the period of initial unit fill of this particular program, the AIT in units program was a major mission for the units and provided them with needed manpower. However, the accent was on quantity fill rather than quality fill (with little regard for MOS and grade match against Army-wide authorizations).

The disadvantages of AIT in units are:

a. As the participating units in this particular program approached authorized manpower levels they were tasked with operational missions requiring higher readiness requirements. The AIT in units program became a liability rather than an asset to the organizations; (i.e., it detracted from unit readiness training, unit missions, and contingency missions).

b. TOE units are not structured to accommodate AIT programs on a continuing basis.

c. AIT imposes personnel and equipment shortages on the unit conducting the training, as well as on some nonparticipating units. Requirements for the most highly qualified and proficient instructor personnel for AIT drain key unit assets. TOE equipment usually suffers from an accelerated rate of wear and tear when used for AIT in addition to required unit readiness training. This results in an increased deadline rate over the short term and premature equipment mortality over the long term.

d. AIT must compete with mission and unit training for available training resources; i.e., training facilities, ranges, classrooms, etc.

e. The Army training centers and service schools have the primary mission of training individual soldiers, and are equipped with qualified instructor personnel and equipment to accomplish that task. AIT in units is not as efficient and cannot do the job as well as fully equipped, dedicated training centers.

f. AIT in units takes longer than that conducted in training centers.

g. Training centers provide better quality control and standardized training.[66]

These advantages and disadvantages apply almost universally for OJT in units, so that particular training strategy which accounts for approximately 4 percent of Army training, will not be examined in detail. However, additional stand-out disadvantages are that OJT tends to be even more unstructured and less controlled than AIU programs; therefore the quality of training suffers even more. Additionally, personnel managers lose control of MOS inventory and assignment flexibility because soldiers completing OJT are frequently not reported to MILPERCEN as trained (awarded MOS). This does not mean that this alternative should be ignored, however, for OJT conducted within well-defined management parameters, supported by quality, exportable training packages, is a viable option.

In an attempt to compare and document the effectiveness and efficiency of variations of OJT/AIU, ARTS has proposed a series of tests over an

extended period in a variety of enlisted MOSs. One variation would utilize selected units to conduct MOS training after personnel have completed normal basic training. A second variation would prescribe that personnel be trained in both common (BT) and MOS (AIT) skills in the unit. In this option, personnel would join the unit directly from the reception station, similar to the way much training would have to be conducted postmobilization. Another variation would evaluate the feasibility of providing specific MOS training in the institution followed by common skill training (BT) in the unit. A final version would involve providing replacement personnel to units who have received institutional training in previously identified critical MOS skills. These soldiers would not have received BT or a complete AIT. The unit would be required to train personnel to proficiency in both common skills (BT) and residual AIT (MOS) skills.

In all proposals, evaluation of comparative costs and the impact of additional training load on unit readiness would be determined by comparison to present institutional costs and proficiency.[67]

A modification to the above, though not specifically being tested, would fall somewhere between BT "socialization" and OSUT. The driving force behind this type of a program is the fact that the Army is expending considerable resources to train soldiers who leave the Service at the conclusion of their first term of enlistment and in some instances even earlier (TDP, EDP). There is a feeling in many quarters that certain skills, particularly those of a nontechnical nature and/or of short training duration (less than 20 weeks) could be trained in the unit.

A way that this might be accomplished would be to create a CMF-oriented OSUT. Soldiers would be trained in the basic skills of a career management field such as CMF 11 in the institution. Subsequently, after assignment to a unit, individuals would be selected by the commander for specific MOS OJT based on personnel management parameters, needs of the unit, and individual capability.

Obviously, there are a number of controls which would have to be established to ensure, among other things, that worldwide MOS requirements were kept in balance, enlistment contracts (possibly modified) were honored, and personnel were accurately reported as having been trained and awarded MOSs. Formal MOS training would not occur until after the first reenlistment, possibly at a PNOC/BNOC or 20-skill level course.

A training option that appears to offer great potential for efficiency as well as improved training effectivness in the near future, is assignment-oriented training (AOT). This program, originated at the Field Artillery School, involves tailoring training to meet specialized needs. Using the soldier's manual as a guide, the Field Artillery School has focused on the M109-155mm SP and the M102-105mm towed howitzers, as they constitute the majority of artillery weapons systems in the field. In addition to the training soldiers receive on these primary weapons, they

receive familiarization with either 8" SP or 155mm towed howitzers.

Further refinement of this program could be done by identifying specific units of assignment which would permit additional specialization in one of the four weapons systems.[68] This procedure has great potential for providing field commanders a soldier who is far better trained for a specific job upon arrival in the unit. Application to other MOSs opens the door to further individual soldier effectiveness as well as training base efficiencies.

The problems involved with identifying specific units of assignment are recognized; however, some refinement can be done now, based only on enlistment contracts. For example, knowing that a field multichannel equipment operator (31M) was to be assigned to an Active Army division, his training could be reduced from the current 10 pieces of complex equipment to 2 pieces.

Examples like this are numerous, even if initial specialization only involved unit-of-choice (UOC) and special-unit-enlistment (SUE) soldiers who can currently be identified with a unit. Further refinement of the personnel assignment system to specific units in USAREUR, KOREA, and CONUS, not identified under UOC and SUE options, could be developed in time. As an interim measure, identification of requirements by unit or station to MILPERCEN indicating job/position requirements could be transmitted to the training center or service school with AIT assignment instructions. This would enable the AIT institution to modify training to that required for the specific job using modular training packages.

A modification to the variations of OJT/AIU previously mentioned involves training in the unit and unit replacement--particularly applicable for overseas. To some observers, programs such as Gyroscope have worked reasonably well, but were normally rejected because of personnel management problems and cost. Although this method of providing replacements has a number of disadvantages, there might be certain training efficiency and effectiveness benefits. These are based on the premise that a unit, probably company-size, could be filled with soldiers from a reception center. The company commander and his cadre would conduct training--possibly at a training center, after which the unit would be shipped overseas to join a battalion. Benefits include the advantages of very specialized job training and possibly reduced turbulence under certain conditions. However, probably the greatest dividend is the initial admiration and loyalty a soldier feels toward his first drill sergeant and company commander. This is converted to unit loyalty where he knows every officer, NCO, and soldier. This is what makes effective teams and fighting units, and supports the fairly accepted notion by many, that teams win wars.[69]

However, there are those who, while agreeing with the effect of unit training and unit replacement on morale and esprit, contend that unit

rotation programs such as Gyroscope and Brigade 75/76 were not particularly successful. In most cases, unit rotation or replacement programs have required more manpower. To maintain one unit overseas normally requires one back-up unit in CONUS and another of equal size preparing to deploy. In addition, due to manning levels and overseas tour policies, it frequently takes two or more units to fill (creating turbulence) one deploying unit. Thus, if unit rotation or replacement on any scale were adopted, the Army and DOD must be willing to risk readiness degradation in other areas.[70]

At the other end of the spectrum are those who disagree in total with unit replacement and who would rather see the Army as a reservoir of individual skills trained to a high level and assigned where the greatest need exists.[71]

With the trend towards specialization, there would normally be movement toward more reliance on civilian contract training which has in the past been a viable option. However, OMB recently issued guidelines modifying previous Administration policy which encouraged Federal agencies to turn over industrial and commercial operations to private firms wherever possible. This has significant potential impact on the Army, in areas from trash collection to aircraft maintenance.[72] Although contract training was not specifically cited, it should be assumed that the same rules apply. Further, since the Army has already made capital investments in existing training operations, cost-effective conversions will probably be rare. Thus, the responsibility for good, efficient training more than ever lies squarely on the Army's shoulders.

There are several other training alternatives which will not be addressed in detail; however, they are presented to stimulate thought. The first involves stationing selected FORSCOM units at TRADOC installations to conduct AIT or follow-on training. This concept with selected Signal units was recently proposed in partial response to DPS 040. However, it is reasonable that there are additional units which could accept a training mission and still maintain a deployable status.

A second alternative would be to improve productivity of the training base by exporting more trainers (mobile training teams, MTT) on a Program 2 reimbursable basis. This is particularly applicable during periods of reduced trainee input. These teams could conduct transition training, augment AIT, or conduct MOS sustainment training. An example would be 19F accelerated refresher training for converted Training Divisions.

Another alternative, which might result in some efficiencies, would be split attendance at BT/AIT for Reserve Component enlistees. This would minimize the impact of being away from primary work for extended periods in that a soldier could attend basic training during one summer and AIT over the following one or two summers. This program, augmented by exportable training packages, correspondence courses, and the USAR school system, could well provide a more acceptable recruiting and learning

environment. It may even be feasible to complete MOS training during multiple unit training assemblies (MUTA), through use of a combination of MTTs, ITDT, and exportable training packages, thus reducing institutional training requirements.

Another aid is the Army correspondence course program, and other exportable training material which lends itself particularly well to supporting decentralized training. Subcourses can be configured into complete courses designed to teach proficiency in a particular job or to sustain or upgrade MOS proficiency. The correspondence course program has been developed using the TRADOC training philosophy of job task analysis and performance-oriented training/evaluation. It is appropriate not only for individuals, but for large groups as well and is a highly accessible, low-cost, and fruitful area for innovative developments. The program is particularly well-suited for group study and supervised OJT, wherein a combination of written materials and performance tasks can be combined in a supervisor-controlled environment to train soldiers in a performance job-oriented program. Furthermore, participation offers promotion points for Active Army enlisted personnel. Participation by Reserve Component soldiers provides retirement year-end credit as well as offering tremendous potential for reaching personnel located in remote areas and unable to attend institutional training.[73]

A review of where training might be conducted would not be complete without a discussion of one of the larger school systems in the Army--that extensive "training base" commonly referred to as the "shadow school system." For the purpose of this discussion, the system does not include education centers, the USAR school system, nor that individual training conducted in unit learning centers.[74]

Most frequently, shadow schools support a major command (MACOM), as does the Combined Arms Training Center (CATC) in USAREUR, or an installation/division, as do a number located throughout CONUS where the average post offers 26 courses and employs 129 full-time instructors.[75] Normally, they serve as a single controlling agency for all "institutional" training; provide functional, refresher and upgrade training in support of operational readiness; validate and establish new courses as required; and frequently monitor and administer major portions of the NCOES program.[76]

Courses conducted in the shadow schools generally fall into three categories: those unique to the command or unit, those in which there is a training shortfall, and those which provide skill upgrade. The first normally fulfills needs either established or modified by the location or mission of units. The second category of training attempts to reduce shortages created by insufficient or untimely replacement flow from the institutional training base, while the last increases individual proficiency on selected equipment. In some of the larger, more sophisticated schools, the emphasis is on critical tasks and is oriented toward a specific

job and/or piece of equipment. However, there are many which do not employ systems engineering and are instructor-centered.

There is valid concern that shadow schools duplicate some of what is done in institutions. In many instances, duplication may occur. However, this is usually a result of turbulence-generated training requirements as well as the learning-forgetting phenomenon. In many cases, training is not necessarily duplicative, but rather more specialized in scope. As an example, TRADOC conducts two tracked-vehicle mechanic courses which cover organizational maintenance of all tracked vehicles. USAREUR, on the other hand, teaches five specialty courses on organizational maintenance for the specific vehicle which the soldier will be required to maintain in his unit.[77]

Is the training effective? Subjective evaluation by commanders indicates that it is. Further, through a system of classification and review, curricula are revised, maintained, or deleted as changes in equipment, personnel strength/qualifications occur, or doctrine is revised, so they are generally up-to-date. Efficient? As currently operated, this is another question. As necessary as the shadow schools seem to be to the using commands, there is probably a basis for modification since some duplication of institutional training does occur and, as a result, resources, regardless of orgin, are used inefficiently. It is worth consideration that shadow schools might be better managed and supported if they belonged to the trainer (TRADOC). In this way, TRADOC could introduce the latest training philosophy and technology, further minimize course duplication, and upgrade training facilities while still maintaining the flexibility to meet specific individual training needs of the MACOM, installation, or unit.

There may also be a valid basis for expansion and "legitimization," for there is still an overwhelming need to provide better formalized school training support for both Active and Reserve Component units in the field. Shadow schools, in concert with the USAR school system, could be mutually supporting in this role. These two systems in conjunction with TRADOC institutions could help overcome a myriad of training problems such as:

a. Inability of USAR schools and active units, except in limited cases, to award an MOS.

b. Standardization of instructor qualification.

c. Training support (standardized student/instructor packets).

d. Identification and coordination of training needs with DA.

e. Administration.

Much has been done with regard to the interface and cooperation of TRADOC service schools and USAR schools. However, implementation of a "total school system" offers realistic opportunities for improving the effectiveness of all individual training. The primary objective is to forge a clear link between the service schools, the shadow schools, and USAR schools by incorporating planning for all support into the service school development process.[78]

A final area of consideration, and one in which the Army has made few inroads, is standardized transition training and the ability to provide rapid refresher or upgrade training to the field. This does not imply that institutional transition training is not conducted nor that much of the technology is not available. What it does mean is that the Army should do it better, faster, and probably in the field because this type of training is particularly suitable to prepackaged, exportable technology. The following are some specific areas of concern:

a. Combat replacement training: training for personnel from one MOS into another where time is most critical. As an example, as a result of heavy battle casualties and corresponding loss of tank crews, how does the Army rapidly train clerks and cooks (possibly women) in the basic minimum skills to fight a tank or other complex weapons system?

b. RC predeployment refresher: training methods or packages which would permit rapid MOS refresher training for RC individuals and crews awaiting deployment.

c. Equipment upgrade training: training devices and technology that would permit soldiers to "train-up" to new equipment. An example would be RC soldiers who have been equipped with M48A5 or M60 tanks who, upon deployment, must convert to XM1.

d. Postconvalescent refresher: training packets designed for retraining personnel who have been absent from duty. Application would be based on technicality of the skill and learning decay and would normally consist of refresher training in a previously acquired skill.

e. Enemy equipment operation: as an adjunct to the Opposing Force Program (OPFOR), a limited, Army-wide Foreign Materiel for Training (FMT) Program is being conducted. This program is designed to provide actual items of foreign military equipment to units.[79] Continuation and expansion of this program should be encouraged. However, since availability of foreign equipment is a constraint, consideration should be given to preparation and distribution of operating and maintenance training packets and manuals such as has been done for the T62 medium tank and the BTR50 armored carrier.

f. MOS transition: training packages similar to those designed for combat replacement training. The major difference is that time would

not be a major factor and methods/devices for training all critical tasks would be included.

Although a great deal of the training material and exportable technology is currently available, they have not in most cases been consolidated to meet specific operational requirements. The training institution could usefully move ahead on systems engineering, total training delivery systems which support the training requirements cited above.

Field Training Capability

Considerable discussion has concerned training individual soldier skills in the field. In addition, since past economizing measures and advanced technology have been unable to offset resource reductions, frequent and sometimes significant resource cuts have forced the Army to either eliminate certain training or shift major portions to the field. Since this trend could most likely continue, a factor of great importance when considering the "where" of training is the capability of units to take on additional training responsibility.

This paper will not address in detail the major limiting factors to unit capability such as time and turbulence, nor aids available to the unit such as learning centers, exportable training packages, and other training literature/technology, for these have been well covered in other Army Training Study research.[80] Suffice it to say that in considering the adoption of any individual training alternative, the capability of the field to conduct quality training should first be considered. What is taught in the institution must be based on what units can absorb without degrading readiness and backward planned from that point.

Results of tests and surveys currently ongoing will provide valuable data as well as insights as to time available, training priorities, and trainer capability. Probably even more important is that the Army appears to be on the threshhold of major breakthroughs in identifying critical soldier's manual tasks which are either terminal or high frequency. This valuable first step is being expanded by ARTS tests and surveys to include setting of priorities and packaging of SM tasks and their relationship to particular collective tasks and missions. Concurrently, there is an attempt to develop "contribution factors" which will be based on integration between various SM tasks as they relate to each other as well as how they relate to collective tasks. Simply stated, how much individual learning can be accomplished (either through selected "hip-pocket" lessons or "osmosis") during the conduct of collective tasks? There is also the reverse benefit in that if soldiers know SM tasks to a high level of proficiency, the need to "put it all together" in frequently repeated collective exercises should diminish.

Research supports the fact that there is the capability to do more training in the field. The technology is there; trainers should learn how,

and be willing to use it. Time is scarce, but available. Training managers should systematically plan training (maximizing multiechelon integration), allocate the time, and then conduct the training. Army training developers should continue to create and deliver priority support materials to the field that permit units to assimilate this information in a logical, systematic manner. Finally, training should be standardized and objectively inspected both at the individual and collective levels. Not only is this critical for the Army in terms of evaluating and measuring readiness and combat effectiveness, but it is important for convincing units that training is actually the first priority in peacetime. If this is not done, the Army can be assured that individual training will continue in the dayrooms, in an unstructured, lecture-demonstration, catch-as-catch-can basis.

CHAPTER IV

SUMMARY

The strength of the Army depends on many factors. Among the most important are its doctrine, technology, and material assets. However, the most important basic resource is trained manpower. An army that fails to train this resource effectively and efficiently will not survive in either the peacetime, resource-constrained environment or war.

For the Army to be an effective fighting force, its soldiers must be proficient in their individual jobs. More and more, this proficiency will be acquired in units which must plan and conduct quality individual training to ensure consistent combat effectiveness.

There have been virtually thousands of studies conducted on how to train better--how to improve the system. A large number have gone unnoticed and fall under what the 1971 Board for Dynamic Training referred to as "forgotten techniques." Many of these could well be revived, for in them lie the keys to solving many of the problems associated with managing and conducting individual training.

This study has attempted to identify and highlight some of the current problems with the personnel and training systems which tend to mitigate against efficient and effective individual training. In doing so, it was generally found that most of the system problems have been recognized and are being dealt with accordingly. There are some, however, such as ASI/SQI training, solicitation, and systematic course review and control that continue to create major inefficiencies.

Additionally, there are as yet major unresolved problems in the field which impact on efficient and effective individual training. Most of these center upon the demand on a unit's time--the most critical resource at the "fighting level." The spectrum goes from emphasis on collective training, to support of RC and ROTC training, to nonessential, nonmission-related training, to post support, to simple work details generated by pressure from above--frequently emanating from as high as DA. Therefore, this is where the emphasis must begin. The priorities are many and most assuredly commanders will continue to be faced with many conflicting ones. This does not mean that good individual training cannot be conducted. The initiatives of the training community with regard to new training

developments and techniques coupled with ARTS tests, surveys and final recommendations will provide a solid base for guiding the tra[illegible] in accomplishing those individual tasks that will ensure training readiness and combat effectiveness.

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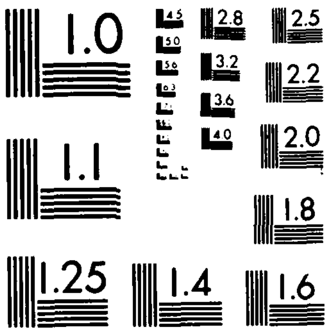

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THE SUSTAINMENT OF TRAINING PROFICIENCY

by

Lieutenant Colonel William B. Valen

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CHAPTER I

INTRODUCTION

In the summer of 1977, Department of the Army directed an Army Training Study (ARTS) to address the following objectives:

a. To determine the functional relationships among four aspects of readiness: training requirements within the total Army, individual and collective training systems; resources needed to conduct that training; the resultant training readiness; and combat effectiveness.

b. To determine the most effective mix of individual training programs conducted in the training base and in the force.

Guidance was to focus on the Army of the 1980's, considering the several new weapons systems due to come on line in that time frame. To structure the study, the following model was developed:

TRAINING RESOURCES ▶ TRAINING PROGRAMS ▶ TRAINING PROFICIENCY ▶ VERIFICATION ▶ COMBAT EFFECTIVENESS

At the highest level of generality, the model states that a given amount of resources will support certain training programs which, in turn, will result in a level of proficiency. This level of proficiency will form parameters for war games, instrumented battlefields, independent evaluations and other verification measures to assess combat effectiveness. However, the act of measuring proficiency, be it individual or collective, is usually preceded by some surge of preparation and ignores the subsequent decay. Therefore, at a second level of detail, the model introduces the concept of training readiness, defining it as that level of proficiency which is sustained.

Thus, the first objective of this paper is to seek insights into skill decay, so that excursions through the model do not overestimate combat effectiveness based on peaks of proficiency. The second objective of the paper is to contribute toward the efficiency and effectiveness of future training programs by including learning and retention considerations in their design.

Definitions and Discussions

Two terms which will be used throughout this paper are training proficiency and training readiness:

a. Training proficiency is defined as the degree to which any performing entity is trained to perform an assigned mission. The performing entity can be an individual, crew, or any level of a unit.

b. Training readiness is defined as the sustained level of proficiency that is maintained over time. Again, training readiness, as a definition, can apply to an individual, crew, or any organizational level of a unit.

The concept of training proficiency, as defined in the context of the Army Training Study and this paper, is a level of proficiency that results in winning capability vis-a-vis the threat. Optimum training proficiency assumes a force to be at least equal to an opposing force. At the unit level, this proficiency may be measured by the Army training and evaluation program (ARTEP) or comparable instruments. At the individual or crew level this may include the capability to employ weapons at their design capabilities. In summary, training proficiency is viewed as a prerequisite element in the equation which would result in victory in anticipated conflict scenarios.

In general, the Active Army assumes that they and the early deploying reserves face a "come as you are war." With limited opportunity for refresher training before deployment, the prediction of combat effectiveness of units must take into account the inevitable performance decay of units who reach peak proficiency only on an intermittent basis. With regard to performance decay, this paper discriminates between the combat support, combat service support, and the combat arms of the Army. The finance clerk, who performs the same job in peacetime as in war, is essentially immune from performance decay. The Redeye gunner, the mortarman, and the forward observer pose a different case, in that their training is normally periodic and simulated. It is these combat arms performances that are so vulnerable to decay. Ironically, the most essential elements of combat effectiveness are the most fragile and least predictable.

Training proficiency of either individual or collective entities is dynamic. For example, units are usually obligated to contribute to post support, usually on a cyclical basis. Between post support periods, training enjoys higher priority than otherwise. It is reasonable to assume that proficiency fluctuates according to the amount of time spent on training. For the reason given in this example, plus numerous other distractors, training proficiency becomes a dynamic state, rising and falling, usually in a cyclical pattern. Obviously, the depth of proficiency decay is affected by the period of the cycle. However, a generic trace of cyclical proficiency over time would look like the following:

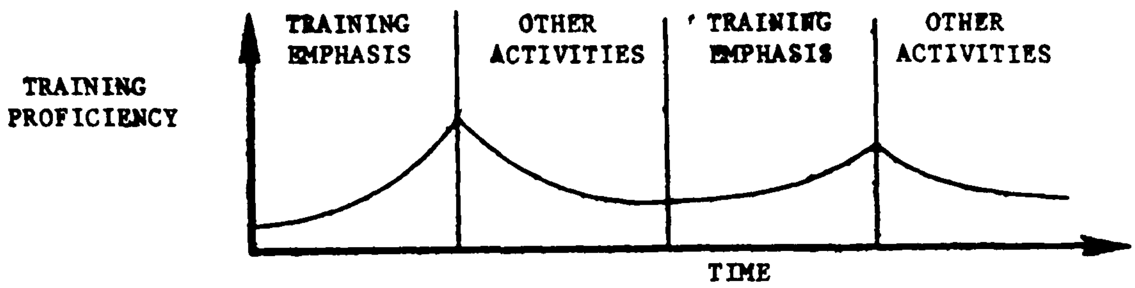

Figure 1-1. Cyclical Proficiency

A trace of cyclical proficiency over time but with elongated periods of training emphasis would suggest higher peaks and valleys as shown below:

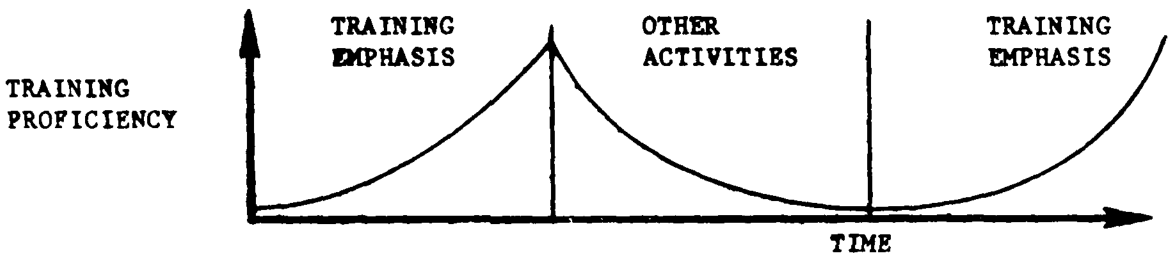

Figure 1-2. Proficiency With Lengthened Cycle

While this discussion might lead the reader to conclude that shorter or longer cycles are preferable, there is probably no single right answer. To begin with, proficiency must be at least equal to the threat. Longer periods of training emphasis can produce higher proficiency, but if they are followed by similarly longer periods of nontraining activities, the result will be deeper valleys of proficiency decay. Thus, the very dynamics of the proficiency curve say more than any single point along the curve.

Many factors can influence the upward or downward slope of the proficiency curve. The point is, it is a very volatile curve, capable of moving dramatically within short periods of time. It is for that very reason that this paper offers a second definition and trace, that of training readiness, the sustained level of proficiency. It is established at a predetermined level, sufficient to defeat the threat in agreed scenarios. This determination also takes into account the time available between the commencement of a threat situation and the planned commitment of a particular unit, for this is seen as a period of potential rapid train-up. This period of intense, precommitment training could vary from zero to several weeks. The popular "come as you are" is an over-simplification. Even in early deploying units there could be some time, and a highly motivated environment, to sharpen skills.

There is ample agreement and evidence that both individuals and units can rise to the challenge of a preannounced proficiency test, be it a skill qualification test (SQT), Army training and evaluation program (ARTEP) or some other training proficiency measurement. However, these occurrences invariably involve surges of effort and, by definition, consume resources far beyond the pro rata share for the surge period. In effect, the surge involves borrowing on future resources or expenditure of husbanded resources from previous periods, or both. In any case, the implication is that prior and subsequent to the surge, proficiency will be lower. How much lower is seldom speculated, much less quantified. Major proficiency peaks naturally enjoy high visibility, but the results of decay are not accorded similar visibility. Therefore, the problem addressed generally in this study, and specifically in this paper, is to sustain proficiency. The objective is to decrease the range of the proficiency curve and bring it into proper relationship to the training readiness baseline. Thus, the ideal generic cyclical proficiency and readiness for any given performance entity would be graphically displayed as follows:

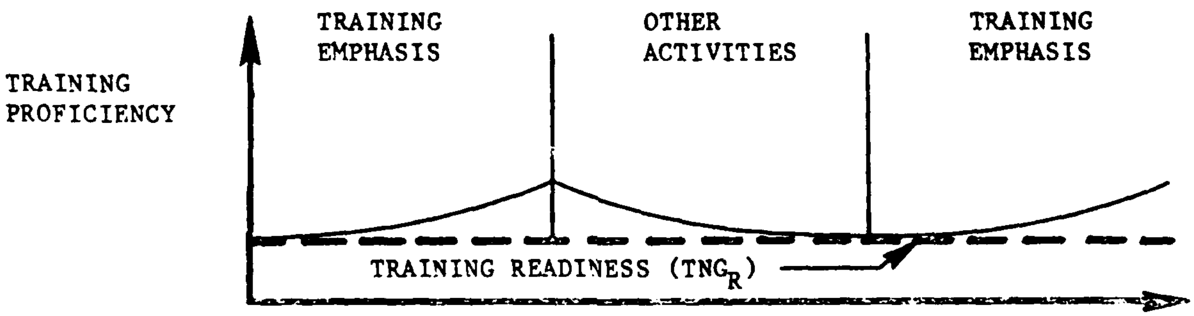

Figure 1-3. Proficiency Versus Training Readiness

Having training proficiency above the training readiness baseline is not meant to imply additional training tasks. It may involve manipulation of criteria or standards. For example, to sustain the ability to don a protective mask in nine seconds, the standards during periods of training emphasis might be to do so in eight seconds. Thus, conceptually there are really two levels of training readiness for either individuals or units. The higher readiness level is what is necessary at the beginning of combat. The lower readiness level is the maintenance level (TNG_R), carefully engineered to match the deployment plan versus conflict scenarios. The movement from the maintenance level to the combat level must be tied to the time available as well as availability of other key resources.[1]

CHAPTER II

SKILL ACQUISITION, DECAY, AND REACQUISITION

As the Army seeks to improve training readiness, the issue is not only how proficient individuals and units are at the climax of intensive training periods, but also how much individual and collective skill decay occurs during periods of limited training or nontraining activities. Research has shown that the method of initial training can affect the forgetting curve and thereby the relearning curve. Hence, this paper will address the skill acquisition, skill decay, and skill reacquisition processes.

It is important at the outset to recognize that research to establish learning and forgetting curves is really not measuring learning. These experiments document the presence or absence of performance, for performance is observable while learning is not. One can only infer that learning is equal to, or greater than, the observed performance. In the final analysis, performance is the issue of interest to the Army.

The significance of skill retention by individuals and units has always been a matter of priority interest to the Army. The June 1975 Advanced Training Technology Conference of the National Security Industrial Association focused on the Army's four major training problems. One of the problems was how to sustain proficiency, stated as follows:

> "How can one achieve and maintain over time proficiency in a given skill, coping with personnel instability, and the normal decay of skills over time? How can one provide for the training of individual gunners, and weapons crews so as to achieve the full capability of the weapons system and maintain a readiness to employ same at that capability?"[2]

Definitions

To give structure and continuity to this discussion of skill acquisition, decay, and reacquisition, it seems appropriate to offer definitions. Therefore, a definition of learning has been borrowed from the psychological community, paraphrased slightly to define relearning, and in turn, the mirror image paraphrased to define decay.

a. Skill Acquisition. Prominent authors define learning as,

"the process by which relatively enduring change in behavior occurs as a result of practice."[3] The authors further explain:

> "The words 'relatively enduring' signify that the change in behavior must be more or less permanent as distinct from a transitory change such as that produced by fatigue, drugs, or temporary change in motivation. The words 'as a result of practice' distinguish learned behavior from changes attributable to growth of the body, disease, change in stimulus situation, and the like. The term 'practice' is intended broadly to cover both formal training and uncontrolled experiences (such as happening to get burned by a match)."[4]

Notwithstanding the difference between skill acquisition and learning, this is a functional definition because behavior is observable.

b. Skill Decay. Using the learning definition as a point of departure, skill decay can be defined as the partial or complete loss of a behavior once present. The practice factor is deliberately deleted, as that would presuppose the cause of skill decay.

c. Skill Reacquisition. Skill reacquisition can be defined as the process of reestablishing a relatively enduring change in behavior as a result of practice. The word "reestablishing" is intended to connote that the skill being reacquired was once present to some relatively enduring degree.

Admittedly, these definitions set parameters for this paper that exclude brain physiology as an approach to the subject of learning and memory. During the 17th century, Descartes proposed a neural basis of memory, the notion that memory was related to the differing transmission capabilities of brain tissue. Early in the 20th century, Karl Lashley embarked on the great engram hunt to locate where memory is stored in the brain. Later surgical procedures which applied electrical stimulation directly to the right cerebral cortex of a conscious epileptic patient produced astounding flashback recollections. Recent experiments on rats with drugs produced a reduction in memory efficiency. However, in spite of considerable ongoing research, this line of inquiry offers no ready clues to the solution of the Army training problems. We are probably a long way from the day of the memory pill.

Theories of Learning

The search for an explanation of how humans learn, and why they forget, is at least as old as written history. Advocates of a single theory argue that theirs is the key to the mystery. Perhaps all the surviving theories have some truth but under different circumstances.

There is some evidence to support each learning theory, and each hypothesis can be rather consistently demonstrated, but usually in selected situations. So far, it has been impossible to demonstrate consistently any single theory applicable to all kinds of people, tasks, and situations; thus, all remain theories.

There are a number of theories built on the fundamental notion that learning is the association of a stimulus and a response. When a driver sees a red light in his path (stimulus), he stops (response). No one is born with that red light-stop association. It is learned. The "imprinting" of these stimulus-response connections on the brain is one fundamental theory. Some psychologists describe stimulus-response learning as "habit formation," and continued practice as "habit strengthening."

Another theory started with stimulus-response but added time as a factor. Responses that immediately follow stimuli are stronger associations than those more separated in time. Another offshoot of the basic stimulus-response theme involved learner goals. In a way, this theory approached learning from the perspective of "why," as much as "how." It held that learning was stimulus-response associations, but for a purpose of satisfying a goal or reducing a need. Indeed, it seems impossible to find learning that is not somehow influenced by a purpose, even if that purpose is not the one the trainer has in mind.

One prominent and well-demonstrated theory grew from the body of research that was not even concerned with theory. This family of researchers concerned themselves rather exclusively with behavior. Based on very consistent results, they saw reinforcement as the key to behavior. They "taught" desired behaviors with reinforcement and erased undesired behaviors with extinction or punishment. Extinction generally occurred when no reaction to behavior was provided. Thus, in a way, these behaviorists changed the basic formula to stimulus-response-stimulus. They saw the key to learning as finding the reinforcement (second stimulus) that, when coupled with a response, will cause the same pattern to be repeated.

Although most research on learning begins with rats, pigeons, cockroaches, and monkeys, each theory must eventually be tested on people to be accepted as an explanation of human learning. Often the human experiments involve relatively simple verbal or motor tasks. For some psychologists, these theories were adequate explanation of lower order skills and rote memorization, but they were inadequate for explaining creative thinking, complex problem solving, and mental processes such as those which gave birth to Einstein's theory of relativity. Thus, the Gestalt school hypothesized that higher learning also involved the comprehension of form, structure, and relationships. If learning were only stimulus-response associations, how could one recognize a melody played by different instruments, at a different tempo, and in a different key?

While these theories remain hotly debated, there is always the possibility that they are all at least partly true. Perhaps humans learn different things under different circumstances and in different ways. Ironically, research on how humans forget offers additional insights into how they learn.

Theories of Forgetting

One of the earliest theories of forgetting was the notion that memories simply fade with the passage of time. The theory has been quite thoroughly challenged and rejected, but it deserves discussion because of its commonsense appeal and general acceptance by laymen. This "theory of disuse" was first challenged by the argument that things happen in time, not because of time. Iron rusts in time, but oxidation, not time, is responsible. Different things are forgotten at different rates. How could time alone be responsible? Further, experiments showed less forgetting occurred during sleep than during an equal number of waking hours. Finally, practice, which should reestablish memory, could actually diminish memory if the practice were coupled with extinguishing responses to performance.

What has emerged to be the commonly accepted explanation for forgetting is "interference." Interference occurs when there are certain similarities between what is being learned and something that has already been learned. Somehow, the distinctions are unclear and the two conflict. Interestingly enough, the past learning does not always inhibit the new learning. Often the new learning erases the old. Thus, interference can occur either forward or backward.

There is so much evidence to support the theory of interference it would be reasonable to establish it as something stronger than theory. The question is, Is interference the only cause of forgetting? There are additional theories of forgetting that perhaps should be considered more supplementary than competitive.

Sigmund Freud proposed that humans have some control over what they forget. He argued that people repress uncomfortable memories that they need to forget in order to maintain a certain self-image. Another line of reasoning says that persons unconsciously distort certain recollections according to how they want things to be. Finally, another theory says that nothing is really ever forgotten but the ability to access memories is occasionally lost. As evidence, this theory cites how older people often have otherwise unexplainable recollections from childhood with remarkable detail and clarity. Similarly, surgical procedures to apply electrical stimulation directly to the brain of a conscious patient have produced a flood of detailed childhood recollections.

Current research is focused on learning and forgetting in the context of multiple memory systems. It is generally accepted that we have at

least two memory systems, short-term and long-term, and perhaps more. This line of research describes short-term memory as being capable of receiving and holding amounts of information, but only for brief seconds. Information must be "encoded" and then passed to long-term memory. If information is not "encoded" in those few seconds it will inevitably be lost, decayed, rejected, or crowded out by new information. This theory gave rise to intense study of the "encoding" process. Experiments have consistently shown there is a limited amount of information that can be successfully encoded during one presentation. This short-term memory capacity ranges from five to nine units with an average of seven. Thus, a seven digit telephone number is the typical amount that can be received in short-term memory. This amount will inevitably be either <u>all</u> retained or <u>all</u> forgotten.

If the only path to long-term memory is through short-term memory and the gate is encoding, then that is a critical factor in learning. Learning to encode involves seeing details in a larger context. Thus, seven random letters (units) saturate the average encoding capacity just as much as seven recognized words. Similarly, if the seven words evoke a single concept then they are treated as one unit.

This experimentation seems to be proving the obvious: that material to be learned will be learned easier and faster if the learner recognizes some familiar parts, or a familiar theme or structure. However, the average capacity to encode successfully should be carefully considered in the organization and delivery of training. When material is arranged to facilitate encoding, the speed of learning has been consistently demonstrated to increase several fold.

One encouraging aspect of the problem is transfer in learning. Like interference, transfer occurs when there is a similarity between the material being learned and something already learned. Positive transfer speeds the present learning because of its similarities with something already known. However, interference is caused by similarities as well. The difference lies in the similarity of stimuli and the similarity of responses. Several principles have been derived to predict and capitalize on transfer. Similarly, principles are available for predicting and avoiding interference. These are outlined in Appendix 1. Further, Appendix 1 contains a more detailed description of learning and forgetting theories.

Before leaving the discussion of forgetting, it is important to note that most authorities warn that, in the real world of training, it is easy to attribute a loss of performance capability to decay when, in fact, the performance capability was never really there. Research on forgetting rigorously establishes the presence of competence by a performance test. The test is specific and total. There is no sampling or generalizing allowed. However, in the day-to-day training world, the determination of performance capability is far less rigorous. Inevitably, this leads to errors in estimating decay.

Consider the simple example of a person who cannot remember names. It usually turns out he never really learned the names he claims to have forgotten. When this person enrolls in a memory improvement course he is instructed on "how to remember." For example, when he is introduced to a stranger, whose name he wants to remember, he is instructed to: (1) ensure he has clearly heard the name, perhaps even asking for the spelling, (2) use the name in the subsequent conversation, and (3) associate the name with the face, the vocation, or whatever other relationships are suggested. Obviously, he is not learning to remember; he is learning to learn, therefore making remembering possible.

In a military setting where rigorous total testing is often not possible it can well be that the performance being trained is not being fully learned by all individuals. Even when the performance capability is initially demonstrated at criteria proficiency, there is often reason to doubt its stability or transferability to a new situation. In summary, there is a danger in overestimating what any one individual has really mastered to criteria under normal military training and testing practices. This results in an overestimation of performance decay.

At this point, one might wonder if learning theories have any value in the Army's quest for more efficient and effective training. The theories remain hotly debated. Perhaps something can be inferred when one sees a college psychology text's chapter on learning entitled "conditioning." However, as one moves from theories of learning and forgetting toward methods and techniques of teaching, learning, and retraining, there is a marked movement toward consensus.

Implications for Training

As one studies the recognized authors in educational psychology or, for that matter, the writings of general psychologists, there is usually a section on how to teach, how to study more effectively, how to improve retention, and the like. Appendix 1 of this paper reviews those questions as answered in five separate books representing ten authors. In spite of the fact that some authors appeared to favor different theories, they are remarkably consistent in describing the techniques to improve learning and retention. Their conclusions are far from arbitrary. They are based on consistency of results and their attitudes might be called pragmatic. Therefore, this common list of guidelines is presented and compared to current Army training. The common guidelines are:

a. Provide learning objectives with criteria.

b. Ensure the meaningfulness and relevance of the objectives.

c. Provide motivation and reinforcement.

d. Ensure organization of material to be learned.

e. Provide distributed practice followed by immediate testing and prompt corrective feedback.

This synthesis of guidelines for improved learning and retention would probably be conceptually acceptable to any Army trainer. However, are these guidelines consistently adhered to or evenly applied? There may be an advantage to reconsidering the Army training scene against these guidelines.

There is no question that the Army is fully committed to expressing desired individual and collective capability in terms of tasks (objectives), conditions of performance, and minimum standards of performance.

The structure that objectives bring to training is so profound that one author states, "It is difficult, if not impossible, to learn a skill if we do not know the criterion for which we are aiming."[5] Objectives undergird the intent to learn. Without objectives, the whole learning effort lacks a common point of departure, a predetermined point of completion and ability to measure the success of the effort in anything more than vague terms.

Early efforts at soldier's manuals are occasionally flawed with regard to clarity or scope of tasks. Army training and evaluation programs (ARTEPs) are frequently criticized for task definitions that include subjective standards. This will undoubtedly improve as the training development community becomes more experienced. Field feedback should also improve the precision of objective statements. In one operational industrial training setting, trainers found that providing learners with specific behavioral objectives reduced average training time nearly 40 percent.[6]

A comprehensive training program for learning to write appropriate objectives has been officially adopted as core curriculum for TRADOC staff and faculty training. Training extension course (TEC) and skill qualification test (SQT) are both derivative of soldier's manuals in that they train and test tasks from the soldier's manual. Both programs are rigorous in their concern for the clarity of the task to be learned and performed. The validation processes of each program identify any tasks that prove to be ambiguous to the soldier.

While every Army trainer would probably agree that the learner would benefit from knowing why it is important for him to master the task at hand, this may be a subject that is unduly abbreviated. When one considers the first-term combat arms soldier whose entire training experience is simulated, there is the persistent question, Is the soldier seeing the simulation as an end in itself, or is he relating the simulation activities to his mental concept of real combat? Written training materials vary with relation to the subject of relevance. Conventional lesson plans usually begin with some description of relevance. However, soldier's manuals do not. It would seem prudent to bear in mind that young soldiers

probably do not see the meaningfulness and relevance that is so obvious to more experienced members.

Motivation is the key factor in all learning and, within limits, the greater the motivation, the better the learning. However, motivation shapes attitudes which are so totally individual as to be nearly infinite and capable of constant change. In a very real sense, any trainer is facing a broad array of individual differences even in the most homogeneous groups. These differences are composites of attitudes, interests, values, previous knowledges, past experiences in learning, study skills, and general mental abilities. These elements are listed in order of decreasing importance to learning. Further, none of these elements are really stable.

In a practical sense, the trainer cannot begin to bring these individual differences on line. However, he can accommodate them by allowing the student the time to learn at his own best rate and building a background of successes. This facilitates a long-term motivation in the learner.

There is little question that reinforcement has a positive effect on both learning and retention. The simplest and most predictable techniques involve: (1) providing positive reinforcement for appropriate learner behavior, (2) providing it occasionally, not constantly, and (3) providing differential reinforcement for a task done only partly right. For many Army trainers this may seem unpalatable. A trainer with a strong orientation toward discipline may use the stick far more frequently than the carrot. Furthermore, in the minds of some, reinforcement equals rewards which, in turn, suggests time off or other expensive responses. While reinforcement does not exclude rewards, it also includes the simplest acknowledgements of something done well. When a sergeant says, "Well done, Jones," or, "I'm pleased with what you've done here, Smith," it can have a powerful effect on the individual and his future efforts. This is recognized and taught in TRADOC's staff and faculty training and the new drill sergeant training program. It would appear justifiable to make reinforcement techniques part of all train-the-trainer programs.

Meaningful material is that which is perceived by the learner in an organized way. Memorized isolated items will not cue the recollection of one to the other. Conversely, when items fit together in some perceived structure, the recollection of one can trigger the recollection of the others. One author comments, "From another point of view, the more meaningful the material, the more associations among its parts exist at the outset of learning; therefore, the less new learning is required."[7] In an experiment with three groups of naval officer candidates, the first group studied a standard Navy pamphlet on discipline. The second group studied a rewritten, highly organized version of the same material. The third group studied a version of the original pamphlet altered to remove all headings, transitional phrases, and scramble the paragraphs in a random manner. When tested, the group that studied the organized version scored an average of 67 percent, while the standard and disorganized version

groups scored 47 percent and 44 percent respectively. Similar experiments have been repeated with comparable results.[8] Organization of the material alone resulted in a nearly 50 percent increase in retention.

TRADOC is pursuing this opportunity, in part, with its integrated technical documentation and training program (ITDT). This program organizes and highly illustrates maintenance manuals based on rigorous t[illegible] analysis. US Air Force efforts in improved technical documentation for the C-141 aircraft resulted in significant training savings and improved job performance. However, this is only one application of organization [illegible] material. Organization, as referred to in this paper, extends to every product of training development. Further, organization, in this context is carefully tuned to the "encoding" process of memory, and the transfer and interference phenomena. Thus, among a body of materials that on the surface all look organized, none may really be organized in this context.

Distributed practice breaks a given amount of practice into several short sessions spread over time. It results in better retention than the same level of effort in one massed practice session. This technique is more effective for motor tasks than for verbal tasks, although [illegible] effective for both.

A typical experiment with the retention of verbal material comp[illegible] massed practice in a single session versus spaced practice. Both [illegible] learned the same material to identical criterion. The following [illegible] displays the superior retention following spaced practice at one, [illegible] and seven day intervals.[9]

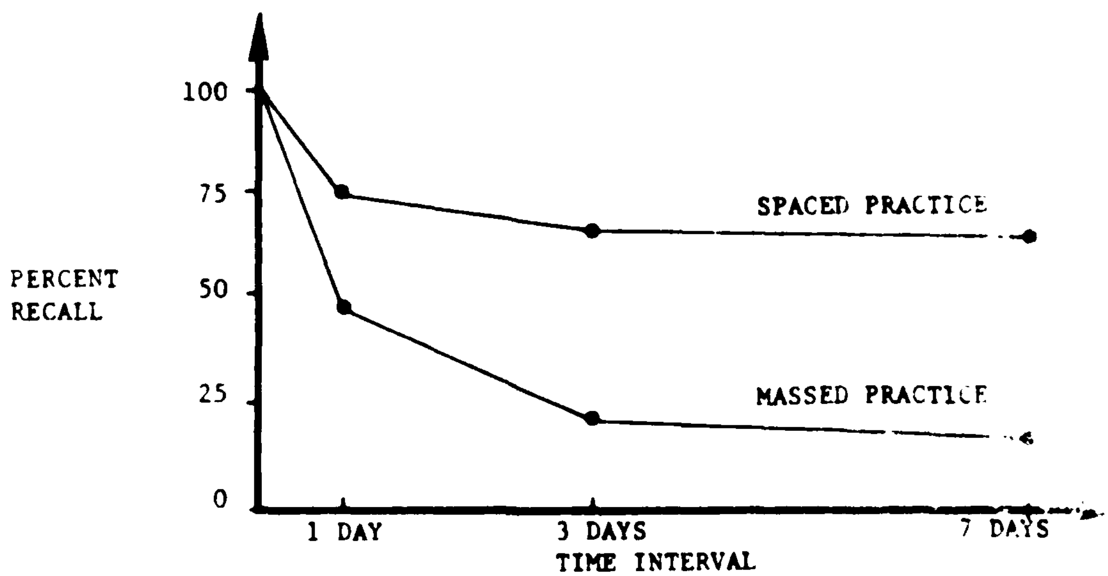

Figure 2-1. Spaced Versus Massed Practice

Similar experiments in perceptual motor skill development used a mirror-drawing apparatus. All subjects had 20 practice sessions. The first group had all 20 practice sessions consecutively; the second, at 1-minute intervals; and the third at 1-day intervals. This, and later experiments, held that the distributed practice was superior to the massed practice. Further, practice at 1-day intervals was superior to practice at 1-minute intervals.[10]

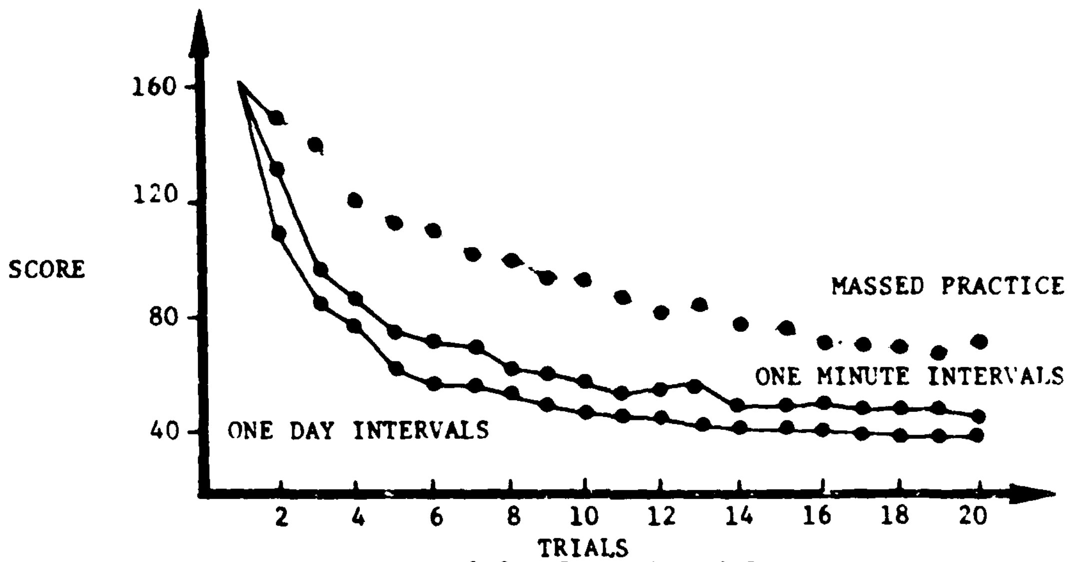

Figure 2-2. Distributed Practice

It is commonly accepted that testing itself is a learning experience. Notwithstanding the relative merit of that statement, research has shown that testing immediately following instruction will result in increased retention and better performance on later tests.

Finally, prompt corrective feedback is considered essential to the learning process. It may be useful to think of skill practice as habit development, as some psychologists do. If the learner is practicing incorrectly, that becomes a habit to be undone before the new, correct habit can begin to be solidified. Of course, trainees often arrive at a level of familiarity with a task such that they can catch their own mistakes and correct themselves, thus eliminating the need for external feedback.

Typically, the Army's application of distributed practice, immediate tests, and corrective feedback varies. Distributed practice can impose a management scheduling workload in both institutions and units. Further, the unit trainer has been given little direction to distribute practice, much less guidance in terms of duration or frequency.

Corrective feedback can be difficult to provide adequately when the

trainer-trainee ratio is high. In this instance, one technique sometimes useful is to use faster learners as peer-tutors. For example, skill practice is followed by a check-out test whenever the individual trainee feels he is ready. The cadre trainer checks out some number of fast learners and redirects them to provide feedback to others still practicing. This enables the cadre trainer to concentrate on check-out testing more or less exclusively.

The application of a test following each task training or practice session is not always reasonable or practical in spite of the value it has in both learning and retention. However, two questions offer insight into whether a test is a worthwhile resource investment. First, is the training at hand prerequisite to the next training activity such that, without competence now, what follows will probably be wasted? Second, is the training at hand a mandatory performance, such as a soldier's manual task, where relative competence should be confirmed? In summary, a test immediately following instruction is, in itself, a training activity. It definitely enhances learning and retention. Further, in the absence of test results, the trainer can only speculate about what has been learned and what should be done next. As one trainer said, "If it wasn't worth testing, it probably wasn't worth teaching."

Motivation and Team Building

Army portrayals of the nature of any future land war in Europe include a new level of weapons systems dominance. This leads to an orientation that speaks of "manning the equipment" rather than "equipping the man." Whereas crew-operated weapons systems have been in the inventory for decades, the weapons systems of today and tomorrow increase in both battlefield density and dominance. Therefore, the subject of team-building of those systems' crews will continue to grow in importance.

Motivation is inextricably tied to team-building, hence this discussion touches on both. Given that these are both complex subjects, this discussion is deliberately limited in perspective and scope. The perspective is behavioral. The scope is the tank crew in the unit environment. More specifically, it is an average tank crew led by a tank commander who wants his crew to perform better.

The tank commander's job is to form his driver, gunner and loader into an effective tank team. They must be disciplined and responsive when they are under platoon control. Further, they must be flexible and innovative if they find themselves operating independently.

The tank commander will attempt to "motivate" his crew with the various individual techniques and at the times he intuitively selects. Motivation, in this case, is defined as exhorting crewmen to higher levels of performance. What may be missing is the awareness of just how sharp the other edge of the two-edged motivation sword really is.

The dilemma is that motivational attempts can backfire, and can actually reduce performance. Strong motivational pressure will facilitate performance when the desired behavior is already established or can be easily acquired. Conversely, strong motivational pressure interferes with performance when the desired behavior is not firmly established nor easily acquired. Motivational efforts result in varying degrees of tension. This is not necessarily bad, but in some cases can result in anxiety, the unfulfillable goal, and can be crippling to the point that the individual "gives up." Implied in the decision to "give up" is an unofficial resignation from even tentative membership in the team. At that moment, the individual has lost his identification with the team. He thinks in terms of "me" and "them." Of course, if all three crewmen "give up" in a single stress scenario they may well unite and it becomes "us" and "him" (the tank commander).

Some psychologists tend to look at motivation as a cycle with three phases. First is the motivated state, a stress situation. The second phase is some action or performance that will result in the third phase, relief. Depending on the level of stress in the motivational state, the subject performs if he can, or quits if he must, to find relief.

Therefore, it becomes important for the tank commander to know his crewmen well enough to temper his motivational attempts with knowledge of how firmly established their performance capabilities are. So far, this is common sense. What isn't so obvious is that under even mild stress, interference can emerge in the form of paralyzing confusion or inappropriate performances. Thus, the crewman who seemed to have all the individual skills in place misreads a cue and does the wrong thing or confuses cu and finds himself immobile from the mental interference. Typically, the tank commander, perhaps himself under pressure, assumes the crewman is slacking and responds in a manner that heightens the anxiety even more. The problem really begins with insufficient attention to interference dangers in training.

Aside from the training techniques that reduce the possibility of interference, the tank commander can take certain actions to minimize the possibility of this occurrence during stress. In general, it would be wise to assume it will happen and reduce the probability. In this case, it is advisable to rehearse the performance, trying to get every crewman to make only right responses regardless of how slow the pace. The actual performance should then be more error-free than if rehearsals are conducted at normal pace and interspersed with mistakes.

A recent review of "state-of-the-art" team-building strategies undergirds the notion that some degree of individual proficiency must be present before team-building can safely commence.

> "One common conclusion in the research on team training, regardless of whether it was based on an 'Organismic'

or a 'Stimulus-Response' view-point, is ... proficiency is the basis for an effective team.... in emergent situations, developing team awareness ... abilities to deal with unexpected problems requires ... each team member has attained the requisite job ... Team training is likely to proceed most efficiently when the team members have thoroughly mastered ... specific assignments beforehand.... Horrocks, et al. ... found that when team coordination was emphasized early in training, it interfered with acquisition of individual task competence.

Horrocks, et al. ... found that if a member of an intact team was replaced by another equally competent person, there was no decrement in team performance. This implied that there was no generalized 'team skill' that operated independently of specific task competencies.... Evidence supporting this finding came ... other AIR laboratory studies..., in which only the proficiency level of the members at the start of ... training determined team performance. ... tions that were routine and well-established, ... performance was seen to be the sum total of individual performances....

Kanarick, et al. ...proposed three phases for ... training: initially, there is the need to train individuals in the procedural aspects of their ... doctrine, and the process approach to ... This training should be followed by a phase in which team members are instructed as a unit, learning the interactive and communicative requirements of ... functioning. The final phase is devoted to ... training where teams are taught to apply their procedural and interactive skills to certain situations requiring innovative and creative behaviors."[1]

Thus it seems team-building is inextricably tied to ... competence. As such, it is woven into the training ... is that an individual's identification with a team is, at least ... function of his perception of his contribution ...

Teams are generally concerned with two functions. First ... plishing the team's tasks or objectives. Second is building and ... ing the team's effectiveness to work as a group.

The ability of any individual to bring some competence and ... tion to team task accomplishment is obviously prerequisite. How... mal activities to develop cohesiveness and pride also call for ...

of individual competence. Successful teams typically exhibit certain internal processes such as encouragement, careful listening, mutual support, harmonizing, meditating, and careful observation of other members. These are largely behaviors built on certain attitudes. An individual team member can develop both the attitude and the behaviors by seeing them modeled and copying the behaviors. However, his credibility must be based on a competence to contribute to the group's tasks, the group's very reason for being. This competence level need only be relatively comparable to the balance of the team. Thus, a green individual can easily couple with a similarly green crew in a tentative team spirit. However, it seems more difficult, perhaps impossible, for a green individual to identify rapidly with a fully competent crew, regardless of the cordiality of the invitation.

In summary, given an opportunity to select what to train, the tank commander may tend to concentrate on the most glaring training weakness common to his three crewmen, and this cannot be labeled wrong. However, from the team-building perspective, he would do better to concentrate his energy on the individual skills prerequisite to team performance lacking in his weakest crewman.

To the extent a relatively equivalent level of competence is prerequisite, the present turbulence of individuals in units makes team-building a treadmill and realization of team effectiveness a very transient phenomenon.

One dimension of the relative leader dominance in any crew-manned weapons system is the capability of the leader to assimilate rapidly new, untrained members. Obviously, this varies with the leader, the quality of the new member and the complexity of the system. As the Army looks ahead, increasing complexity of weapons systems is a given, and the anticipated quality of soldiers will at best remain constant or perhaps decline. Thus, the ability of the leader is the variable which must be manipulated upward. Specifically, the tank commander, just behind the lines in the fifth day of war, must be able to create rapidly a driver and a loader from another two MOSs in the replacement stream, even if they are a cook and a clerk. This rapid training to return weapons systems to the battle is an area deserving further investigation. At a minimum, it implies the development of training strategies and experimental packages for that type of battlefield problem.

From another perspective, relative leader dominance varies across weapons systems. However, the trend is toward systems that are more complex and more dependent on the singular competence of team members. The team organization and the systems functions are more linear. The systems output is increasingly no better than that of the weakest member. Once in combat the capability of the leader to dominate spontaneously the team performance, and thereby control the systems output, may be lessening.

With regard to cross-training within the team, growing systems complexity makes that goal less and less attainable within the current training environment. A strong case can be made for not even attempting cross-training until competence in the primary function is firm and fixed. Beyond that, perhaps the sustainability of the system in combat should drive the decisions of what to cross-train. Who is most likely to be [illegible]ular casualty? What team position could be filled quickly by the next man in the replacement stream regardless of his MOS? In other words, how can the weapons system be kept fully operational at, or near, the design levels of performance?

CHAPTER III

PRESENT SUSTAINMENT PRACTICES

In a presentation given in support of the Army Training Study, Dr. Milton S. Katz of the Army Research Institute offered the following summary of performance acquisition and decay of military skills:[12]

TYPE TASK	ACQUISITION	DECAY
Simple	Rapid	Slow
Complex Procedural	Gradual	Fast
Fine Precise Skills	Slow	Immediate (Requires continuous training)

Figure 3-1. Acquisition and Decay Time by Type Task.

While this summary is discouraging, it is consistent with real world experience.

Individual

A real world "forgetting curve" which reflects decaying proficiency over time can be illustrated by a test conducted by the Human Resources Research Organization. In this experiment, the proficiency of a group of soldiers with the rifle was measured repetitively from the time they initially qualified on the weapon in BCT until completion of their first year of unit training.[13]

Number of Weeks in the Army	Average Qualification Score Obtained
4-5	52
14-16	44
24-52	*30

* 1 point above unqualified

Figure 3-2. Marksmanship Proficiency

A second example compares decay of the first-round probability of hit for both expert and marksman Dragon gunners.[14]

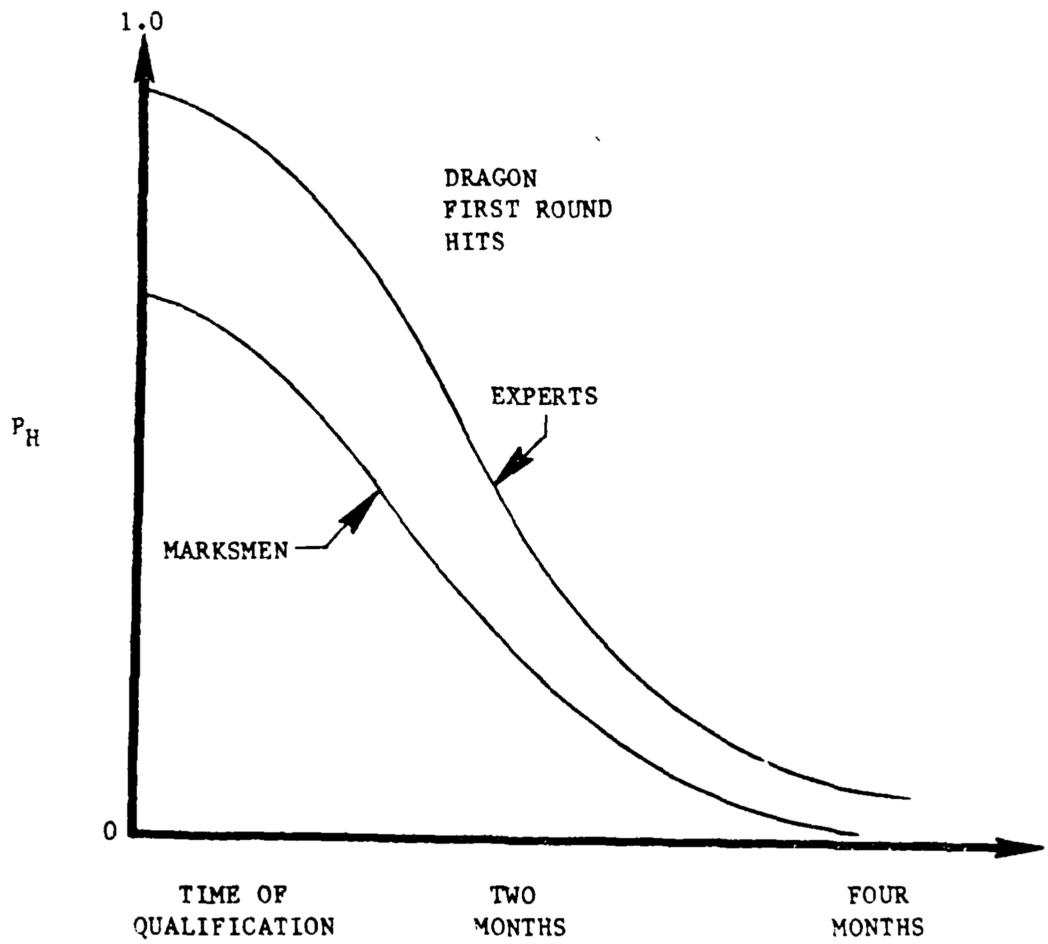

Figure 3-3. Dragon Gunner Proficiency Decay

A third example is drawn from training extension course (TEC) effectiveness data when compared to conventional instruction on the same subject. The following chart reflects projected decay curves based on retention between the eighth and ninth week after training.[15]

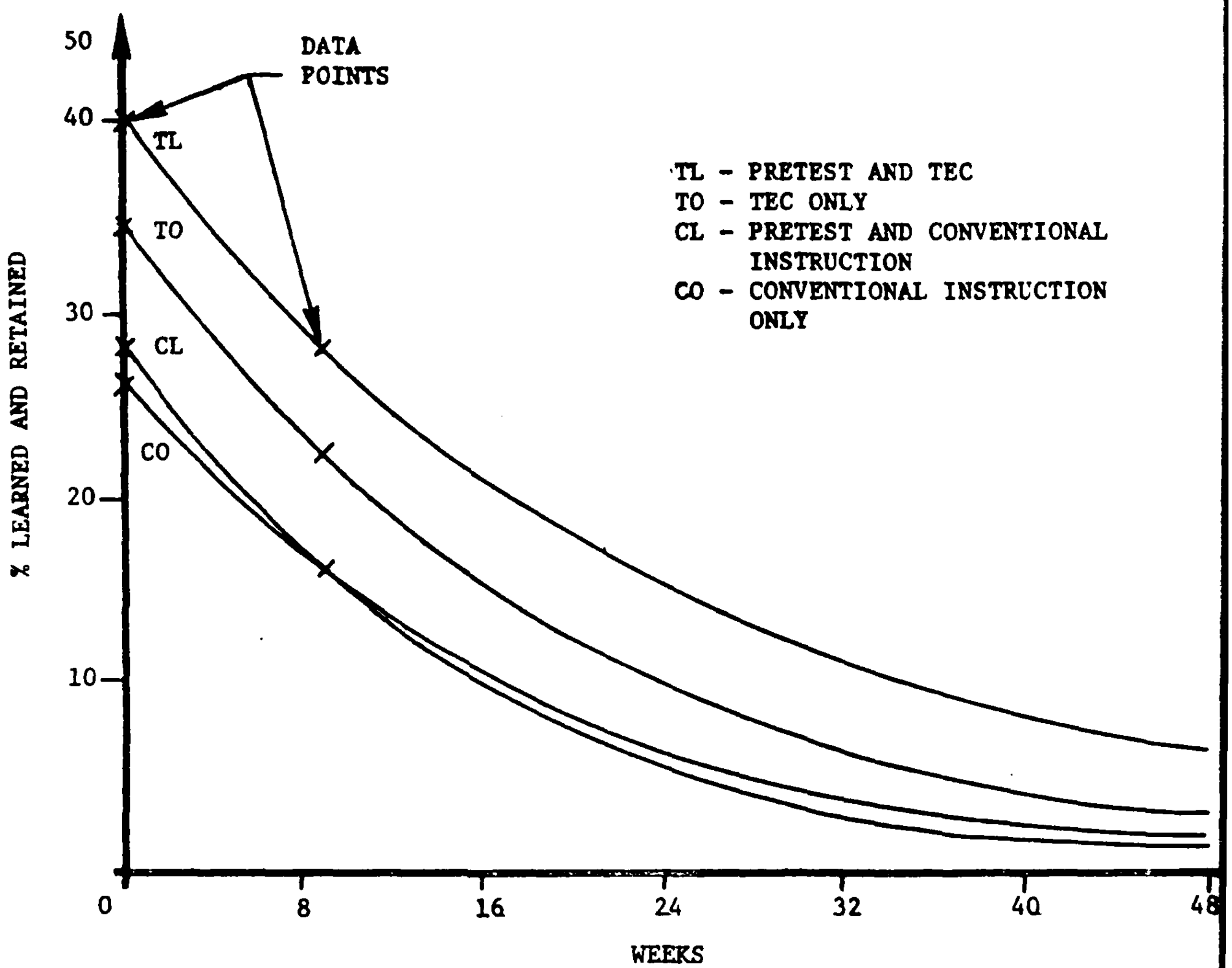

Figure 3-4. TEC Versus Conventional Instruction Decay Rates

The last example is an experiment which tested 200 soldiers on 13 performance tests upon graduation from basic combat training and again 6 weeks later. Results showed the probability of the average soldier passing the test at BCT graduation and again 6 weeks later was .55.[16] Put another way, only 110 of the 200 soldiers could pass an average basic training performance test 6 weeks after graduation.

These examples all deal with whole tasks measured on a "Go" or "No Go" basis. Similarly, Army Training Study's Training Effectiveness Analysis Program for 1978 (TEA 78) calls for broad-scale testing of critical skills

in selected weapons systems and MOS. In each case the testing is Go or No Go for the tasks in question. However, task performance is usually a composite of both type-performances and subskills.

One basic training center battalion commander, otherwise generally pleased with the performance of his trainees, commented, "We have no difficulty with basic training except when the task involves speaking--anything that involves verbalization, like detect and report. Then everything seems to fall apart."

Most military tasks are not purely psychomotor, verbal or cognitive, etc., but a mixture. Tasks usually have a dominant characteristic, but treating the task in accordance with that can lead to disastrous consequences. For example, riding a bicycle is a motor task until one considers riding the bicycle through traffic. Then the cognitive and affective content of the successful performance becomes rather critical. In a parallel military example, performing misfire procedures involves motor skills, verbal skills, and cognitive skills. Thus, the trainer is faced with elements which will typically be learned and forgotten at different rates. This discrimination offers some opportunity for relief from what otherwise is an overwhelming onslaught of performance decay. The discrimination will be further addressed later in this paper.

One leading instructional technologist recently observed that there are four strategies for levelling the performance decay curve.[17] They are:

a. Job Performance Aids.

b. Reduce the time between initial training and actual performance.

c. Overlearn in initial training.

d. Refresher training.

If one assumes all four strategies to be equally effective for a given performance problem, then the costs of each individual strategy would vary dramatically. The strategies are listed in order of increasing cost, that is job aids are typically the cheapest and refresher training typically the most expensive strategy.

Considering the strategies one at a time, strategy two, reducing the time between initial training and actual performance, is a limited option to the Army. The strategy can be viable in the context of both institutional and unit training. For example, analysis of the 63H automotive repairman revealed that several tasks taught in AIT were usually performed only by the more experienced mechanics in the grades E5 and E6. In the absense of the opportunity to perform these tasks, the junior mechanics forgot what they had been taught. As a result, the Ordnance

School deleted these tasks from AIT and created a Skill Level 2 course for the training of these tasks.[18] In so doing, the time from initial to actual performance was reduced literally by years.

Similarly, the unit training manager can occasionally reduce the training-to-performance time, especially with obvious candidates such as seasonal tasks, like winter driving. However, the most important tasks, those associated with combat, are the least predictable, hence strategy two is, and will remain, a very limited option to the Army.

Strategy three, overlearning, is a viable option but has limited effectiveness in flattening decay curves. Overlearning is the deliberate continuation of skill practice after initial performance is achieved. Unfortunately, the name implies extravagance. The learning curve also implies extravagance, as overlearning is, by definition, a plateau.

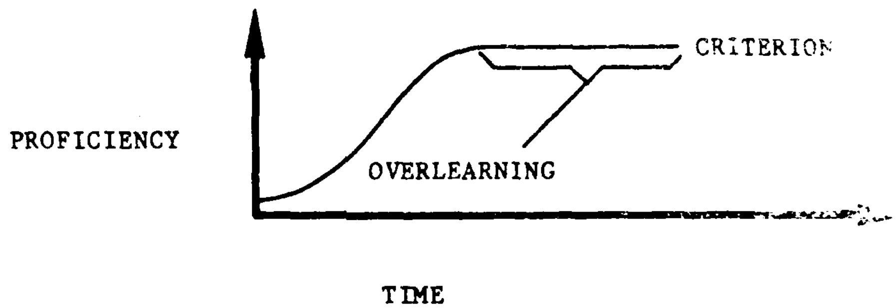

Figure 3-5. Hypothetical Learning - Overlearning Curve

While overlearning has value primarily in terms of the improved retention, it falls well short of perfect retention. Hence, as a strategy, overlearning only partially levels the decay curve.

The first strategy, job performance aids, circumvents the forgetting problem by providing the performer with necessary memory prompts. Broadly speaking, job performance aids are defined as things which guide performance at the job site. Job aids are not new but they are deserving of special mention for two reasons. First, to the extent that job aids can be integrated into a job performance, they reduce or perhaps completely eliminate the problem of retention. Second, the state-of-the-art [illegible] aid technology has moved very rapidly in recent years to the [illegible] it suggests new dimensions of benefits to the military. However, consideration of a strategy involves exploring the nature of job aids and the types of tasks for which they are appropriate.

The scope of items that can qualify as job aids is very broad, hence the definition of job aids is difficult to derive. The most common examples of job aids would be checklists, decision tables, decision trees, or algorithms. A decal with instructions for starting a lawnmower qualifies as a job aid. On the other hand, an algorithm which leads the performer through complex procedural and decision-making tasks is also a job aid. The most sophisticated job aids include self-evaluation features for the performer to evaluate his own performance, that is, to signal when he is doing something incorrectly and point him toward the correct performance.

At first, it may seem that job aids are inappropriate to military performances. It is true that job aids are completely inappropriate to some military task performance. However, there is a significant number of tasks where job aids would be appropriate and offer significant benefits.

Perhaps the key to the dramatic advantages of job aids is that their presence essentially changes the nature of the task to be performed. For example, for a mechanic to troubleshoot an electrical system fault is a complex cognitive decision-making task, typically very difficult to learn and especially vulnerable to rapid decay. However, if the mechanic has a trouble-shooting job aid, the performance is now a procedural task requiring less training and no recall. One might criticize this approach by saying the job aid mechanic has less "understanding" of what he is doing, and that may well be true, but if he successfully performs the trouble-shooting task the strategy is a success. Additional "understanding" is, by definition, irrelevant. Successful task performance is what matters, no more, no less.

The successful integration of job aids either eliminates the requirement for training or reduces it rather dramatically. One leading developer of job aids states that training time is reduced perhaps 90 percent of the time, and totally eliminated the remaining 10 percent of the time. Where training is reduced, what remains usually constitutes training on how to use the job aid. Typically, the reduction is 75 percent or more in training time.[19]

The critical question is, Must the performance be from recall? If the task is characterized by some urgency, that is, the task must be performed immediately, then instruction for recall is the appropriate strategy. Similarly, there can be physchological or social factors which make job aids objectionable.

The urgency of task performance eliminates many combat tasks from consideration of the job aid strategy. For example, it is necessary that immediate action to clear a malfunctioning weapon be a memorized automatic response. Further, the utilization of job aids by a performer can be objectionable for psycho-social reasons. One example would be the negative

effect on the trainee's perception of his drill sergeant if the drill sergeant used a job aid "crutch" to teach close order drill.

Conversely, job aids are usually indicated for complex tasks with a large number of steps or where the performance method is likely to be changed. Further, job aids are especially appropriate when tasks are infrequently performed and there is a requirement for high accuracy and completeness in the performance. For example, Army pilots routinely use check lists in their pre-flight procedures. The reasons are job aids provide greater accuracy of performance and the consequences of inadequate performance are serious. Conversely, pilots do not use check lists during flight other than for routine procedures because flight emergencies require immediate response.

The Army has moved into job aid technology with its integrated technical documentation and training (ITDT) program. A joint venture of TRADOC and DARCOM, the ITDT development process begins with either fielded or developmental systems and includes a front-end analysis to determine precisely defined performance requirements. The next step is the development of a technical manual, functionally organized and illustrated to guide the performer through the tasks identified in the analysis. Again, based on a functional requirement, selected job aids are produced to be used when the technical manual would be inconvenient to use. The contractor-developed products must be validated in the hands of the intended target population before being fielded.[20]

Job aid potential has been recognized in the Army and other Services as well by a subroutine in the instructional systems development model. Specifically, when the training developer identifies skills and knowledges for which training will be required, he next enters a subroutine where consideration of job aids is the first step. This is an acknowledgment of the well-established fact that successful application of job aids is far and away the least costly path to satisfactory performance.[21] However, until recently, there has been no procedural guidance on the design, development and validation of job aids. Current state-of-the-art of job aid technology has been "systematized" to the point that several training programs are available which make the pursuit of job aids an easily trainable skill for the Army's training development community.

The training extension course (TEC) program also recognizes job aid potential in that TEC contractors are encouraged and rewarded for developing job aids in lieu of the more expensive TEC lessons. The monetary incentive is much lower than the normal profit margin for the development of a full lesson. However, it is set at a level which results in higher profit for the time expended.

Recently the Army Research Institute sponsored a 2-day seminar with civilian, military, and other Government trainers. Attendees were selected for their common involvement in training tasks that are infrequently performed and often have high consequences of inadequate performance. The

results of the seminar were that both civilian industry and other Government agencies are using job aids extensively under those circumstances. Although initial performance with a job aid is usually slower, the job aid will often result in performance from recall over time. It represents the least costly approach to organizations where budgetary pressures often dominate the decision process.

For example, the training manager for a power company described how the starting and synchronizing of emergency power units during blackouts is done by any employee available at the moment. None of the employees are trained to perform this task. If the synchronization is done improperly it will cause major equipment damage, extending the blackout. In spite of this, the entire task is supported with a well-designed job aid on the power unit which will lead the employee through the complex performance, by the light of a flashlight.[22]

The simplicity in appearance of most job performance aids can be deceiving. Even the most simple can involve significant depth of analysis, design and developmental testing. Within the specialty of training development, it is commonly agreed that one of the most difficult tasks is to gain agreement on a definitive description of the desired performance. Often the tendency is to require a higher order of performance than what is truly required. One common manifestation is to require the performer to commit to memory the procedures and knowledges inherent in the performance. While there can be any number of legitimate reasons why performance must be from recall, there is a sizable body of performances where memory prompts in the form of job performance aids could be appropriately utilized. Obviously, there are trade-offs. Job performance aids may slo down the performance. On the other hand, the use of job performance aids predictably increases the accuracy of the performance. The decision must be made on a case-by-case basis. However, where job performance aids are indicated, they very neatly leap over the entire problem of knowledge retention.

In summary, the advantages of job aids, as a strategy, argue for its serious consideration whenever performance need not be from recall. In effect, the question of the necessity of recall divides job aids from the other three strategies. It would seem well advised for the Army training community to broaden its application and accelerate its pursuit of job aid technology. Potentially, this could accommodate major shifting of resources, dollars, people, and time to other areas where training is the indicated approach to the creation of performance capability.

The fourth and final strategy is refresher training. Periodic skill practice is the most common approach to correcting performance decay found within the Army. As a technique, it is obvious and abundantly supported by research. One problem is that units approach skill practice on an unsystematic "whenever we can fit it in" basis. Units are usually driven by directed activities which leave the commander little flexibility for scheduling skill practice. Two, the Army has not provided empirically

derived guidance on what, how long, and how often to practice to sustain skills at an acceptable level.

Although usually the most expensive strategy for levelling decay curves, refresher training is often the only major viable strategy for the Army to pursue. This is especially true with the combat performances. The severe time criterion of performance usually rules out job aids. Timing initial training is impossible because the requirement for execution is unpredictable. Further, the degree of overlearning required to sufficiently level decay curves is probably impractical. This would require major shifts of resources toward initial institutional training at the expense of unit training.

Hence, periodic refresher is, and will remain, a major Army strategy for the sustainment of skills, especially collective combat skills. Other strategies, especially job aids, offer great potential benefits in selected areas, and savings are certain to accrue. However, it can be persuasively argued that the shortfall in conducting adequate refresher training to maintain acceptable levels of training readiness should and would consume the accrued savings. Although resources are only shifted, the result should be a better trained Army.

Returning to the issue of the undefined frequency and duration of refresher training, one battalion commander attacked the problem in this manner.[23]

Faced with unsatisfactory results in 32 mid-cycle and end-of-cycle performance tests, he hypothesized that the major problem was decay. Soldiers were unable to pass fifth week mid-cycle tests on skills taught in week two. He reasoned that the soldiers needed periodic retraining which he called "exposures."

His first objective was to achieve effectiveness, which he defined as 85 percent of his traineees being able to pass their mid-cycle and end-of-cycle performance tests. By having his drill sergeants experiment with various frequencies of exposures, he found, by a series of successive approximations, that three to eight exposures achieved the effectiveness objective. The number of exposures varied with the difficulty of the task and the time interval between initial learning and subsequent testing.

His second objective was to increase the efficiency of the exposures approach. This involved several considerations. First, was the task really mastered at the time of initial training? The committee-group training sessions on a particular task did not always conclude with a performance test. In some cases, the time available to the committee-group allowed testing of only some of the soldiers in the trainee group. Thus, not knowing the proficiency level of individuals forced them all to be treated alike in refresher exposures. To correct this, the training center directed full testing of all trainees at the completion of each block of instruction (with the exception of M16 assembly-disassembly, and drill and

ceremonies where full immediate testing was impractical). Thus, with regard to initial training on any given task, trainees could be segregated into three groups:

a. "Go" on initial training test.

b. "No Go" on initial training test.

c. Absent from initial training.

Second, how should each group of trainees be handled with regard to subsequent exposures? The three groups range from total unfamiliarity with a task to one-time demonstration of competence. Second exposures were abbreviated versions of initial training. Subsequent exposures were approached as a repetition of the initial training process but individual soldiers entered at any of three levels.

RESULT OF INITIAL TRAINING	SUBSEQUENT EXPOSURES
"Go" on initial test	Immediately take test again
"No Go" on initial test	Commence with additional skill practice and attempt test as soon as ready
Absent from initial training	Commence with explanation-demonstration, enter skill practice and attempt test as soon as ready

Figure 3-6. Exposures After Initial Training

In essence, the exposures are self-paced and individualized. Each trainee's past performance determines the level at which he enters refresher training. Further, within limits, the trainee proceeds at his own pace to mastery. Fast learners are often used as "trainee tutors" for others not yet competent. Occasionally, those who pass the test early are rewarded with a break or more enjoyable activities such as organized sports.

As the reach for efficiency evolved, the unit developed insights into what parts of tasks were most likely to decay first. For example, experience to date suggests "failure to check backblast clearance" is the common discrepancy in simulated Light Antitank Weapon (LAW) performances. Similarly, "failure to clear the weapon" is the most common discrepancy in M16 task performance. Thus, the unit trainers were able to focus more efficiently on common discrepancies within tasks.

Additional efficiencies have been achieved by reducing paperwork associated wih this exposures program. For example, all trainees are

assumed to be "Go" with regard to a task; therefore, training roster entries are only made for "No Go," or absent, trainees.

In summary, this unit independently evolved a systematic approach to sustainment of skills by a process of experimentation with successive approximations. The approach, in use for approximately 10 months and 20 basic training cycles, has averaged over 90 percent of trainees receiving first-time "Go's" on end-of-cycle tests. The approach is now incorporated in the revised, self-paced drill sergeant training program authored by the Army Training Board.[24]

Collective

For the sake of this monograph, the spectrum of collective performance is divided into three types:

a. Multiindividual *performance:* Each member of the collective entity is performing as an individual, perhaps colocated but independent of other members. The collective output will be the simple total of the individual outputs. For example, three mess hall cooks frying eggs on three adjacent griddles illustrates multiindividual performance. The individual cooks take their initiating cues from their patrons and each interacts with the first cook supervisor. However, the output of the mess hall team will be the sum of the outputs of the three cooks.

b. Serial collective performance: In this case, the output of the collective will be no better than the output of the least adequate performer in the collective entity. An example would be the artillery system where the resultant fire can be no more accurate than the fire directions called in by the forward observer. The conditions of this type of collective performance usually involve dispersion of one or more members of the collective and little or no opportunity for corrective feedback from another member during the performance.

c. Parallel collective performance: In this case, the collective output falls somewhere above the weakest individual member and above the simple sum of each individual's contribution. An example would be a pilot-copilot team where one can give corrective feedback to the other during performance. Another example would be the medical operating room team where the surgeon can talk assistants through performances they could not do independently.

The area of collective performance acquisition and decay has been relatively untouched by the scientific, educational, or military analysis communities. Part of the reason lies in the inherent unreliability of even controlled experimentation with the complex collective entity. Serious researchers consciously and rigorously avoid experiments that are known in advance to produce unreliable findings. Therefore, the issue of collective performance must be addressed by putting together the individual performances. However, the very nature of the relationship between

the individuals' contribution and collective performance varies with the type of task as previously discussed.

It is an oversimplification to say collective performance is the sum of individual performance components. It is analagous to the chicken and the egg. Charismatic leaders produce new heights of collective performance. Nonetheless, were the performance potential not already there, this could not occur. On close analysis, collective learning is really only a composite of individual learning. Conversely, collective performance decay is only a composite of individual performance decay. What has to be sorted out is each individual's unique contribution to collective performance on a task-by-task basis.

At first glance this appears to be an overwhelming endeavor. However, two considerations should be borne in mind. First, this same individual-to-collective contribution is done intuitively every day at nearly every level of the Army. An experienced squad leader knows how to assign his men to produce optimum collective performance (Give Jones the machinegun and put Smith on point). Second, theories and research in learning and forgetting should enable the training development community to predict, with reasonable accuracy, the high decay elements of any performance so that attention can be focused on them. In a systematic program with self-correcting design features, the total resources and energies of the sustainment training effort could be focused on the known high-decay areas. One can only speculate at the potential improvement in sustaining performance from such an approach.

The mechanism for isolating relative decay rates within tasks is the task learning hierarchy. The learning hierarchy is a critical interim product in Mager's criterion referenced instruction approach to designing and developing training, new core-curriculum in TRADOC's staff and faculty training program.[8] The purposes of the learning hierarchy are many. As an example, here is a partial hierarchy;

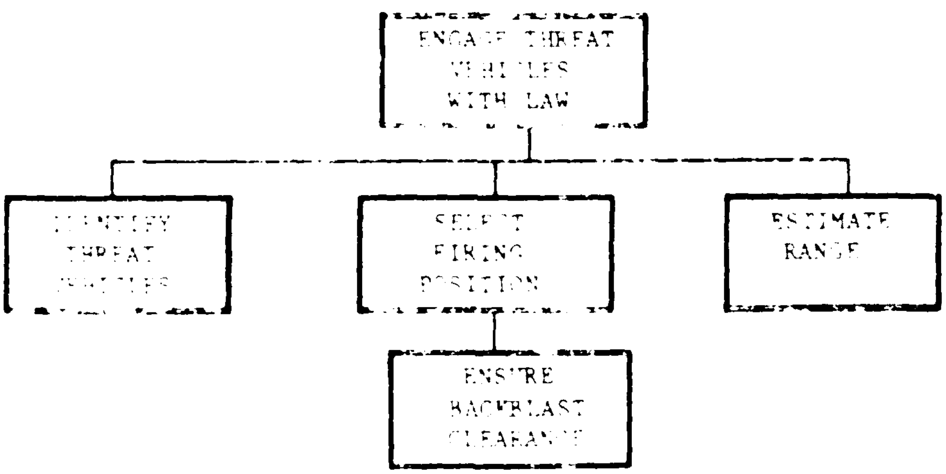

Figure 3-7. Partial Learning Hierarchy

The utilities of expressing the elements of a task in a hierarchy are as follows:

a. It displays the dependency of elements of the task; i.e., you must learn backblast before you learn to select a firing position.

b. It displays independency of elements; i.e., you can learn identification of threat vehicles totally separate from estimating range. This often eases the resources required. When masses of lock-step trainees arrive at the same training subject at the same time, resource demands are highest. When element independency is known, one can spread the trainee load across the independent elements. In the unit environment this can optimize local and major training area time by isolating what can be trained just as well, perhaps even easier, in garrison.

c. The hierarchy facilitates positive transfer in that, by definition, anything subordinate to a given point on the hierarchy is the array of enabling subobjectives that allows the learner to encode and commence practice. As one prominent educator said:

> "It was possible...beginning with a clear statement of some terminal objective of instruction, to analyze this final capacity into subordinate skills such that lower-level ones could be predicted to generate positive transfer to higher-order ones."[26]

What is suggested here is that the same hierarchy can be used to identify probable high and low decay elements. As stated above, initial judgments would be based on the general conclusions from retention research. In the example above, backblast clearance is more likely to be forgotten than firing positions. Similarly, identification of threat vehicles is far more perishable than adequate estimation of range. Over time these judgments could be replaced with experience factors. The basic premise, supported by available data, is that soldiers do not forget whole tasks; they forget certain elements of tasks. Moreover, discrimination suggests opportunity to sustain skills better within existing resources.

The US Army Reserve and the Army National Guard play an important role in Army planning for any major conflict. The readiness of Reserve Components to join the Active Army in an armed conflict is predicated, in part, on their capability to mobilize, accomplish needed training, and deploy. The issue under discussion here is the "needed training."

Although Reserve Components are sometimes short of equipment, this constraint can usually be worked around so as to lessen its impact on training. The 1976 Reserve Evaluation Report cited other problems: high personnel turbulence (33 percent losses and 29 percent gains), 36 percent of the enlisted reservists not working in the jobs for which they were trained, and only 46 percent of crews qualified on their weapons during

active duty training. However, the common denominator of reserve training constraints is the 39-day training year. The issue then becomes, what is reasonable to train and sustain prior to mobilization?

As one considers the alarming rapidity of decay of complex procedural tasks and fine precise skills, a case can be made that some training should not even be attempted, for there is statistical certainty that those skills will be lost. It would seem prudent to divide the spectrum of things to be trained into low and high decay performances and address the latter in a mobilization training package. Further argument for a mobilization training package is the high-low equipment mix, the armor units with M48 tanks that could deploy to fight on M60 or XM1 tanks.

Even the earliest deploying units would have some definite period of time for training after mobilization, perhaps even during deployment itself. Obviously motivation, the energizer of behavior, would be high, and skill development per unit of time would be potentially high. The critical prerequisite is the prepositioned, preplanned, well-designed mobilization training package along with whatever cadre support is required. However, the basic premise is that knowledge about performance decay should be a consideration in defining what the Reserve Components are expected to train and sustain prior to mobilization.

In the same vein, there is some concern about the TRADOC evolution toward state-of-the-art training methodologies such as self-paced courses. Could mobilized reservists take over such a training system? There is no clear answer, but there are some indications the transition would be a relatively minor problem. For the past year the Army Training Board (ATB) has conducted self-paced, criterion-referenced training management workshops for Reserve Component personnel. These reservists, in turn, conduct iterations of the workshop within their organizations.

LTC Paul Ogg, Chief of ATB's Training Assistance Division, states that the transition of reservists to the new generation of training approaches has been remarkably smooth. He cites four indicators. First, ATB's self-paced workshops have been highly praised by reserve attendees who see advantages in that approach. Second, reserve training divisions work side by side with their active duty counterparts during their annual active duty, and are thereby exposed to new methodologies. Third, USAR schools are receiving and implementing modernized training materials from the TRADOC training development community. Last, self-pacing is seen as the logical way to capitalize on the increased motivation inherent in mobilization. Self-pacing allows learning to occur as fast as it will. In summary, LTC Ogg says the transition is underway, the process has been smooth, and the progress significant.[27]

Notwithstanding these indications, the question is too important for complacency based on limited evidence. Further, this evidence is from

peacetime experience while the question being considered is mobilization. Just as the one station unit training (OSUT) initiative broadened the required drill sergeant's domain of competency, so has self-pacing. The course manager in a self-paced course usually must be competent to handle a broader domain of training activities. It would seem appropriate to inquire deeply into the capability of reserve trainers to manage such a system during rapid mobilization.

A problem common to both Active and Reserve Components is the utilization of trained skills. However, the limited training year makes this problem more extreme for the reserves.

The Military Occupational Development Division of the US Army Military Personnel Center (MILPERCEN) conducts surveys of MOSs on a periodic basis. These mailed surveys query MOS holders as to the tasks they perform, the frequency of performance, the percent of time spent performing, and other pertinent data. Whereas MILPERCEN uses survey results for MOS management, the MOS-producing school of TRADOC may use survey results to answer the critical question "what to train."

This mechanism for job analysis is a powerful tool for matching training to the real world job. Discrepancies between training and the job can be readily identified. For example, a survey of MOS 71C, stenographer, revealed that 24 percent of the job incumbents use no shorthand and another 15 percent make only very marginal use of it. During FY 1977, it cost the Army $250,000 (using the 24 percent figure) to $400,000 (using the 39 percent figure) to train personnel in a skill that is not fully utilized.[28]

Aside from the obvious cost implications, the unexercised stenographer skills are subject to certain decay. It would appear that some 71C incumbents are used essentially as typists. After a tour without stenographic skill practice, the incumbent will either require refresher training or enter the job at least initially unable to perform as required. Either way, the Army pays a resource penalty.

From the unit's point of view, there are at least four reasons that can reduce the full utilization of all trained skills:

a. Lack of time, expertise or other resources to exercise the skills.

b. The unit's present operation requires only part of the total skills trained.

c. There can be reluctance to allow newly assigned incumbents to utilize skills where there are high consequences for inadequate performance. The newly graduated computer repairman may very well find himself used for only simple, safe tasks, and janitorial duties because the

supervisor habitually doubts the competence of a new man. The newly learned skills may be fragile and decay very rapidly in the absence of reinforcing experience. Thus by the time the supervisor calls for the incumbent to perform, the skills are not there.

d. The unit may be unaware of the full inventory of skills the incumbent has been trained to do. The soldier's manuals, commander's manuals and job books should eventually ease, and hopefully eradicate, this problem.

Aside from the impact on the Army, there is some evidence that it is a matter of concern to even first-term soldiers. In a recent survey, a common complaint among first-termers was that the Army does not make effective use of the quality training given personnel in many of the AIT schools, allowing it to be ignored when the individuals are assigned to a unit. Notwithstanding the legitimacy of the nonutilization of skills, there is a cogent argument for a disciplined system that demands a reconciliation of these discrepancies. If a skill is not needed, it should be eliminated from training. If it is needed, the unit must exercise it, even if only for contingency use.

CHAPTER IV

FUTURE SUSTAINMENT APPROACHES

Consideration of future approaches to sustainment training might begin with two fundamental challenges. First, has the performance to be sustained really been attained? Second, are certain performances within the repertoire of an individual, or a collective being, interfered with by other similar performances?

Considering the latter question first, it is quite conceivable, and even predictable, that there is interference. One indicator would be the historical difficulty surrounding training for identification of threat vehicles and threat aircraft. To the learner, the discrimination of threat equipment poses a classical interference problem. The stimuli initially all look quite similar, yet the responses are totally dissimilar. Even after some period of training, the differences in stimuli are subtle. The classical approach to avoid interfering learning is to stress the distinctions. Hence, threat vehicle silhouettes used in training often exaggerate distinctions such as tank turret slope, or aircraft tail shape. Thus, if the assumption is made that interference is a problem, then techniques to reduce the problem are available. The training development community should be able to identify and highlight potential interference areas. The approach need not be sophisticated. Trainers, either institutional or unit, need not understand the theory of interference. Training materials for tasks subject to potential interference could be annotated to alert the trainer that the similarity of this subject to another may cause some confusion in the minds of the trainees. Hence, the trainer would be encouraged to speak to the relationship and stress the differences.

The first question, whether performance competence is really being attained, is far more difficult because it opens the issue of what is critical to attain.

The average Skill Level 1 soldier is responsible for perhaps 100 or more individual tasks. These tasks are (or will be) listed in his soldier's manual. Early soldier's manual tasks were selected based on "criticality to accomplishment of mission and survivability in combat." (See Appendix 2 for a description of the evolution of task selection criteria.) Candidate tasks were rigorously screened and reduced to ensure that the published soldier's manual tasks could be indeed critical to mission

accomplishment and survivability. On a task-by-task basis each one can be persuasively defended. What may have been only peripherally considered was the question, In how many tasks can the average soldier achieve and maintain competence? From another perspective, how many tasks can the average soldier absorb in a finite training setting? For example, the tasks to be trained in basic training, in a sense, compete with the amorphous "socialization" process and the inculcation of values. Thus, even from this common point of departure, it is difficult to make generalizations with confidence.

While there are occasional insights into human potential for competence, there is no empirical basis for estimating that the average 11B1 can potentially and cumulatively master 100, or 75, or even 50 tasks. The Army is forced to address the question intuitively. Initial experience with skill qualification tests suggests the overall level of performance is well below what the Army has stated to be minimum competence in critical tasks. Therefore, the persistent question is, Is it really beyond the soldier's capability?

It may be dangerous to wave aside the question by increased emphasis on training. Within available resources, many Army units train as vigorously as possible today. Even if training were the sole activity of combat arms units, the question persists, Can the average soldier become competent in that broad a domain of tasks and maintain competency? From another perspective, in attempting to train so many tasks, does the Army dilute its efforts and end up with less than the total competence that could be attained?

A case can be made for the alternate approach of training fewer things, and being sure they are done well. Even within those which are critical, there are some tasks so basic and so predictably necessary in combat as to demand obvious priority over others. Once truly mastered and systematically maintained, the individual or unit could move on to additional broader competency. In time, this approach would generate the necessary experience factor to determine the saturation point of performance competence. This approach could lend some certainty to what is now a very subjective area.

One vehicle for probing the question of capability is the concept of "high frequency" tasks, both individual and collective. These are the tasks and events which are fundamental and of prime criticality in combat. As an example, selection criteria might include "an 80 percent probability of occurrence during the first 5 days of combat." Once identified, these tasks would be the subject of performance decay research, to establish the frequency of execution in peacetime, and to ensure sustainment at an acceptable level. Further, resources to support these repetitions would be calculated. Thus, annotations to a soldier's manual or ARTEP could describe frequency of repetition and resources required. Refinements might identify the most efficient way to conduct the repetitions.

These tasks and events could become essential training for the unit commander, and his chain of command would expect him to train just as certainly as he is expected to requisition replacements from the personnel system. Once the tasks and events are mastered, and that mastery is clearly being maintained, then competency could be incrementally broadened to include additional performances dependent upon the mission of that particular unit. Finding the saturation point, the maximum performance that can be attained and sustained, seems to argue for starting with a subset and adding tasks, rather than starting possibly beyond the point of saturation and enjoining the Army to try harder.

Logically, the next question has to do with how the frequency and duration of sustainment repetitions might be empirically derived. The magnitude of resources implied in conventional research to determine skill decay curves can be exemplified by a current project at the Army Research Institute. The objective of the project is to determine decay curves for the following six Skill Level 1 Chaparral crewman tasks, selected as basic skills the AIT graduate should be able to perform the first day in the unit:

a. Pre-energizing the M54 launch station.

b. Energizing the M54 launch station.

c. De-energizing the M54 launch station.

d. Before operations PM checks on the M730 carrier.

e. Installing and operating the TA-312/PT telephone set.

f. Emplacing, operator checks, and adjusting the target alert data display set AN/GSQ-137 (XO-2).

The measurements will be made at 30, 60, and 120 days after graduation from AIT at Fort Bliss. To ensure a test bed of 100 soldiers, ARI must deal with 200 Fort Bliss graduates, for approximately half will end up in Redeye assignments. The end-of-cycle AIT testing at Fort Bliss is only partially a hands-on performance test. Therefore, ARI had to develop and administer a hands-on test to ensure the mastery of the six tasks upon graduation. The test units are seven Chaparral battalions in USAREUR. Dr. Joyce Shields, the project director, estimates the ARI investment in this study will be three professional man-years.[29] The cost of the test equals approximately $200,000, excluding the cost of troop time or data collection and reporting by unit personnel.

While research into Army skill decay is generally accepted as being necessary, the resources involved in conventional approaches are high, perhaps prohibitive. Dr. Milton Katz of ARI posed "a diagnostic testing approach as opposed to extensive, low-yield, high-cost, data collection."[30]

Expanding on his position:

a. Extensive: there are over 140,000 tasks in question.

b. Low-yield: learning or decay curves are composites and represent the average of enormously differing performances. Each soldier has a different curve vis-a-vis each task, and today's curve may well be different tomorrow. The complexity of collective performance curves, added to real world turbulence within collective entities, limits their utility to only gross generalizations.

c. High-cost: using the aforementioned 16P Chaparral task decay study, derivation of even simple curves is prohibitively expensive.

d. Data collection: there is some evidence that data collection is a problem for units, a question which is discussed at greater length in the Summary of this paper.

Nonetheless, determining the array of decay curves so that the Army could specify repetitions of practice necessary to maintain proficiency involves some form of experimentation. Psychological experiments on retention and forgetting have focused on three principle methods: recall, recognition, and relearning. All three methods begin with learning something to a specific criteria. This is followed by a time interval, free of practice or related activity. Then subjects are retested. A brief description of each method follows:

a. Recall. The subjects study the material, usually word lists, until they can recite them without error from memory. After a time interval with no practice they are retested. The percentage recalled in the second test is the percentage retained.

b. Recognition. The subjects must learn to discriminate between similar objects. For example, Redeye gunners study slides of aircraft to recognize friendly from threat aircraft until they achieve mastery of a given amount of material. In the second test, the percentage of correct recognitions is equal to the percentage of performance retained. If the subjects were also required to name the aircraft, the test would be a combination of recall and recognition.

c. Relearning. In this method, the subjects, after a time interval, must relearn a task to the same criteria. The time to learn during the subsequent attempts compared to the time required for original learning indicates a savings which can be credited to retention. This is commonly referred to as the "savings method."

There appears to be some merit in considering the "relearning" approach as a strategy for determining critical decay curves. The premise is that some "relearning" activities are ongoing and need only to be tapped

for the data necessary. Eventually, this will yield decay curves.

To be viable to the Army in the near term, the strategy to determine decay of skills must not demand significant additional resources, nor involve more than minor shifting of existing resources. This constraint essentially eliminates conventional research to determine skill decay curves. However, refresher training is an everyday occurrence in both the training base and the force. This suggests that curves could be accumulated over time by the classical "savings method" of measuring decay. This method compares the time required to reach mastery in initial training with the time required to relearn to mastery after an interval without practice. The ratio of the two times is converted to a percentage of retention. This approach presupposes a stable definition of mastery and comparable approaches to both original training and retraining. However, criterion-referenced tests are a matter of policy within TRADOC, and the performance-oriented training philosophy has produced major similarities between training base and unit training approaches. Thus, there is a significant and growing body of performances which could be compared using this methodology. With a data collection program providing learning and relearning times at the nearly random intervals that they naturally occur, the Army could eventually accumulate the needed families of decay curves with a modest data collection and analysis effort.

To achieve acceptably accurate curves, the data collected would have to be from initial and relearning training that meets the preconditions. There could be any number of reasons that the preconditions would not be met and, therefore, no data collected. The proposed concept simply says, when initial and subsequent training of a task is to the same criteria, record the time of each and the interval of time between them. Given an accumulation of such information, one could derive a curve which displays average time to reach criteria in initial training, and the time to reacquire competence after various intervals free of practice. This would give the Army an ever-increasing empirical basis for determining the optimum frequency and duration of sustainment training.

Given decay curves for skills and systems, one could approximate, and summatively define, which elements of tasks decay at the highest rate, and then develop skill practice frequencies and durations which allow the performer to regain competency. The intent is to schedule skill practice before the skill has decayed to a point which requires instructor intervention. Therefore, the strategy must discriminate between rates of decay associated with elements within a performance. A simplistic example would be donning the gas mask. A soldier probably never forgets how to put on his gas mask, although he predictably loses the capability to do so in 9 seconds. The appropriate response is to provide an opportunity for skill practice, not to repeat the original explanation-demonstration phase.

CHAPTER V

SUMMARY

Research into the question of decay of combat-critical skills is sparse, but indications are that it is of gross dimensions. It seems imperative that a strategy be devised to upgrade training readiness with a systematic program designed to decrease skill decay and sustain combat-critical skills, and to accomplish this within existing resources.

There are indications that the training development community can more widely incorporate what is known about learning and decay into their efforts. Current training analysis often fails to discriminate which performances must be from recall versus those that can be supported by job aids. Current design and development practices sometimes fail to capitalize on what is known about interference and transfer. Further, the significance of organization of material to be learned is well supported by research as a major factor in learning and retention. Integrating these considerations into procedures for Army instructional systems development suggests an opportunity for substantial flattening of decay curves.

Units, either unilaterally or preferably in concert with TRADOC, could approach retention in a manner similar to the "exposures" approach. Adding a central collection and analysis agency, the Army could begin to define decay based on retraining times as they naturally occur in the force. While each of these alternatives hopefully are the simplest, none are truly simple. The dimensions of the sustainment issue clearly suggest that some systematic approach should be designed and developed.

Critical Issues

The dimensions of external turnover and internal turbulence suggest a literal treadmill for unit trainers and training managers. For example, a recent turbulence study in the 7th Infantry Division revealed approximately 50 percent turbulence within the average squad within a 4 month period.[31] From the point of view of the squad leader, this may represent a new squad member two weeks. From the perspective of training (only one of several aspects of concern), the squad leader must somehow determine the new member's capabilities and commence a form of remedial training against identified performance shortfalls. Given the normal time and resources available, it is difficult to envision a squad leader being

able to train and sustain his squad members in more than a subset of the entire task domain charged to the squad. A follow-on experiment with the 7th Division intends to measure the task saturation point of squad leaders as they attempt to train their squads under various levels of turbulence.[32] For a further discussion of the effect of turbulence, see the Army Training Study Concept Paper entitled "Unit Training Programs."[33]

Part of the price of progress is the inevitable paperwork, data collection, records, and reports. Within the Army much of this effort falls on the unit, since alternatives such as outside data collectors usually involve prohibitive costs. Each of the existing and emerging programs discussed in this paper contributes something to the unit administrative workload. Most of these programs have self-correcting design features but are dependent on user feedback--which creates additional paperwork. On a case-by-case basis, the paperwork burden associated with a program appears fully justifiable. However, when aggregated, the burden appears to be beyond tolerable limits. If this is so, then programs suffer accordingly. For example, the absence of ARTEP feedback may be inhibiting the realization of the full potential of that program. In conclusion, this issue would appear to deserve close inquiry. Information processing technology may offer some alternatives.

The Army's first peacetime priority is training. Every day enormous resources (time, money, and effort) are expended to achieve or upgrade training proficiency. Inevitably, the performance capabilities gained through these resource investments will erode according to varying rates of decay. Such losses will vary from insignificant for some performances to nearly total for others. Thus, the Army needs to develop and implement a systematic sustainment training program to protect its investment in initial training and maintain an appropriate level of training readiness.

Developing a viable systematic program to sustain performance capability implies research to determine which performances or parts of performances decay at what rates. With this information, the Army can define what and how to train for retention, what skills to refresh, and how often to conduct refresher training. Development of such a program is in itself a major initiative. However, is there really any alternative?

APPENDIX 1

When a competent performer demonstrates a skill, he manifests a recognition of an initiating cue (stimulus) and reacts with an organized pattern or sequence of responses. The stimulus-response structure is common to a family of "associative" theories, greatly differing internally, but common in their notion that learning is a process of associating stimulus-response elements formerly unknown, or at least unrelated in the mind of the learner.

Theories of Learning

Thorndike theorized that learning was the "imprinting" of stimulus-response connections. The connections would be strengthened if the consequences of the response were satisfying. Conversely, connections would be weakened if response consequences were other than satisfying.

J. B. Watson shifted the focus to what learners do and how they behave. Starting with Pavlov's work on the conditioned reflex, Watson argued the importance of environment in shaping behavior. He did not view reinforcement as a condition of learning, but held that recent and frequent responses are more likely to reoccur.

E. R. Guthrie proposed "the principle of recency." Learning occurred when the stimulus and response occurred close together in time. Like Watson, Guthrie did not view reinforcement as essential to learning although its indirect effect was acknowledged.

Hull constructed a comprehensive theory featuring an equation of learning. Starting with the stimulus-response connection, the equation incorporated habit strength; magnitude of reinforcement; excitory potential of the stimulus to provoke the response; level of drive; and reactive inhibition (the required level of effort and fatigue involved in responding).

B. F. Skinner, the developer of the concept of operant conditioning, denied all inner process variables in favor of environment as the controlling factor of learning. For Skinner, the key was to discover what reinforcer couples with the desired response. Reinforcement was not theoretical, but empirical. A reinforcer was, by definition, any stimulus which, following a response, increased the probability that that response pattern would be repeated on the next occasion.

To many, the family of associative theories summarized above seemed inadequate for complex human learning. Stressing stimulus-response and varying notions of reinforcement, and their supportive experimentation with animals in simplified learning situations, they seemed to offer little insight into the human phenomena of problem solving or higher levels of reasoning. This led to cognitive theories of learning, two of which are summarized below.

One of the Berlin School Gestalt psychologists, Max Wertheimer, agreed that the associative stimulus-response theories were sufficient to explain rote memorization but that productive or creative thinking involved the learning of underlying processes, configurations, structures, and forms. This "Gestalten" allows one to recognize a familiar theme even though particulars may be changed, to recognize a melody although played in a different key. Therefore, higher levels of learning involve concepts and generalizations rather than specific responses.

E. C. Tolman focused on broad patterns of behavior. He theorized that learning was not the bonding of stimulus-response but the result of experience with one's environment. He believed needs produced goals, and rewards led toward some goals and away from others. Thus, stimulus-stimulus connections are made, the first being external, the second being experiential. Learned behavior was seen as purposive, involving goals, hypotheses and expectations.

These and other theories have stimulated extensive research, yet all remain theories. Current trends in research seem to have abandoned the quest for the all-encompassing theory in favor of more selective work on information processing, memory storage and retrieval, and imagery. Free recall studies generate massive bodies of behavioral data which is analyzed after the fact to find patterns of consistency with manipulated variables. Another current area of study is the manipulation of contingencies for behavior modification. Based on the earlier theories embracing reinforcement, variable contingencies are being effectively used therapeutically for improving maladjustive or pathological behaviors.

Theories of Forgetting

One of the oldest theories of forgetting is the trace decay theory, the notion that memory traces, the impressions of experiences on the nervous system, simply fade with the passage of time. Every one has probably experienced the annoyance and befuddlement of being unable to recall something which was once well known and committed to memory. "I know it as well as I know my own name...it's right on the tip of my tongue...." The fact that these memory failures occur in spite of no known causes gives the trace decay theory commonsense appeal. However, during the 1920's and 1930's experiments to test the theory led to strong challenge. How could the mere passage of time account for forgetting different things at obviously different rates? In 1932 John A. McGeogh wrote;

"Even if disuse and forgetting perfectly correlated, it would be fruitless to refer the forgetting to the disuse as such. Such reference is equivalent to the statement that the passage of time, in and of itself, produces loss, for disuse, literally interpreted, means only passivity during time. In scientific descriptions of nature time itself is not employed as a causitive factor nor is passive decay with time ever found. In time iron, when unused, may rust, but oxidation, not time, is responsible. In time organisms grow old, but time enters only as a logical framework in which complex biochemical processes go their ways. In time all events occur, but to use time as an explanation would be to explain in terms so perfectly general as to be meaningless."[1]

While McGeogh took trace decay out of serious contention in the minds of most psychologists, it can be speculated that trace decay, the simple fading of memory with time, could be persuasively argued to any layman. It is speculated that the average military trainer accepts forgetting as a natural function of time and sees repetition of practice over time as the appropriate counterattack.

Today, interference is widely embraced as the primary, if not the sole, reason for forgetting. Interference occurs when something a person is learning has certain similarities to something else learned in the past. The interference inhibits retention of both items and causes one or the other of the learned items to be forgotten. Therefore, interference is of two types, proactive and retroactive inhibition. Proactive inhibition is when something learned in the past interferes with the learning at hand. Retroactive inhibition is when the learning or activities of the present interfere with things learned in the past. Experiments with interference have been of two basic designs to correspond with the proactive and retroactive phenomena. In both designs the time interval is variable but always free of practice or related activity.

Proactive Inhibition

	Task	Task	Time Interval	Test
Experimental group	#1	#2	Same	#2
Control group	-	#2	Same	#2

Retroactive Inhibition

	Task	Task	Time Interval	Test
Experimental group	#1	#2	Same	#1
Control group	#1	-	Same	#1

Figure A1-1. Interference Designs

Typical results in either test are that the experimental group forgets significantly more than the control group whether the time interval is minutes or weeks. Obviously, if time alone were responsible for forgetting, then activities, before or after the learning, would have no effect.

Anderson and Faust (1975) cite an interesting array of research results with experimentation on interference.

> "It is one thing to say that interference is a cause of forgetting and quite another thing to say that it is the only cause. Even the control groups in experiments...show a considerable amount of forgetting. How is it possible to explain such forgetting in terms of interference? A classic experiment was completed in 1924 by Jenkins and Dallenbach to test this hypothesis. At each of several sessions two people learned a list of nonsense syllables. In the time interval that followed they either slept or engaged in normal waking activity. Overall, more than twice as many nonsense syllables were recalled after periods of sleep than after periods of normal activity. Similar results have been obtained with meaningful prose materials (Newman, 1939; Grison, Suedfeld, & Vernon, 1962)."[2]

When the results of the experiments cited above were challenged on the grounds that subjects supposedly sleeping might be mentally rehearsing, while similar rehearsal would be more difficult during normal waking activity, the experiment was repeated with cockroaches. The cockroaches were conditioned by electrical shocks to move from a darkened end of an enclosure toward a lighted end, a reversal of their normal behavior. During the subsequent period the experimental group of roaches were kept inactive in small individual closed containers. The control group roaches were allowed to run freely in their normal cages. After various time intervals, the roaches were retaught to move to the lighted end of the test enclosure. The amount of time to relearn the behavior determined the amount retained from the original learning. The results of this 1946 Minami & Dallenback research are shown on the next page:[3]

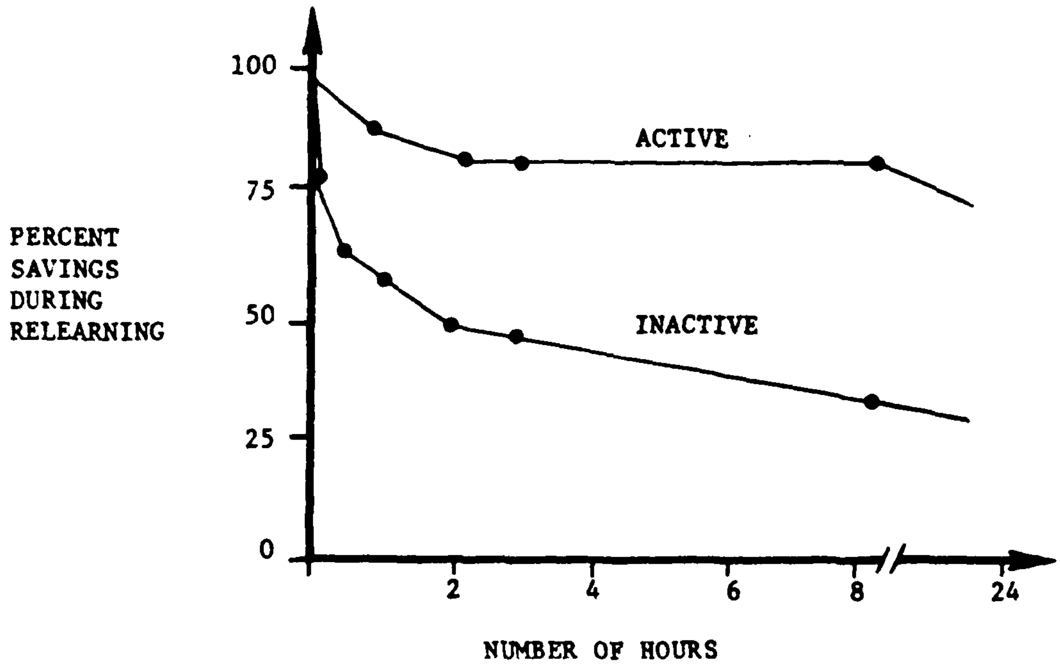

Figure A1-2. Decay as a Function of Relative Activity

Transfer and Interference

Learning transfer is defined as the effect of having learned one task on the learning of another. Positive transfer occurs when the similarity of stimulus and response relationships between the two tasks facilitates learning. However, interference also involves a similarity of either stimulus or response. Thus, interference can be thought of as negative transfer.

In 1949, Charles E. Osgood devised a pictorial respresentation of this relationship in his Transfer and Retroaction Surface shown on the next page:[4]

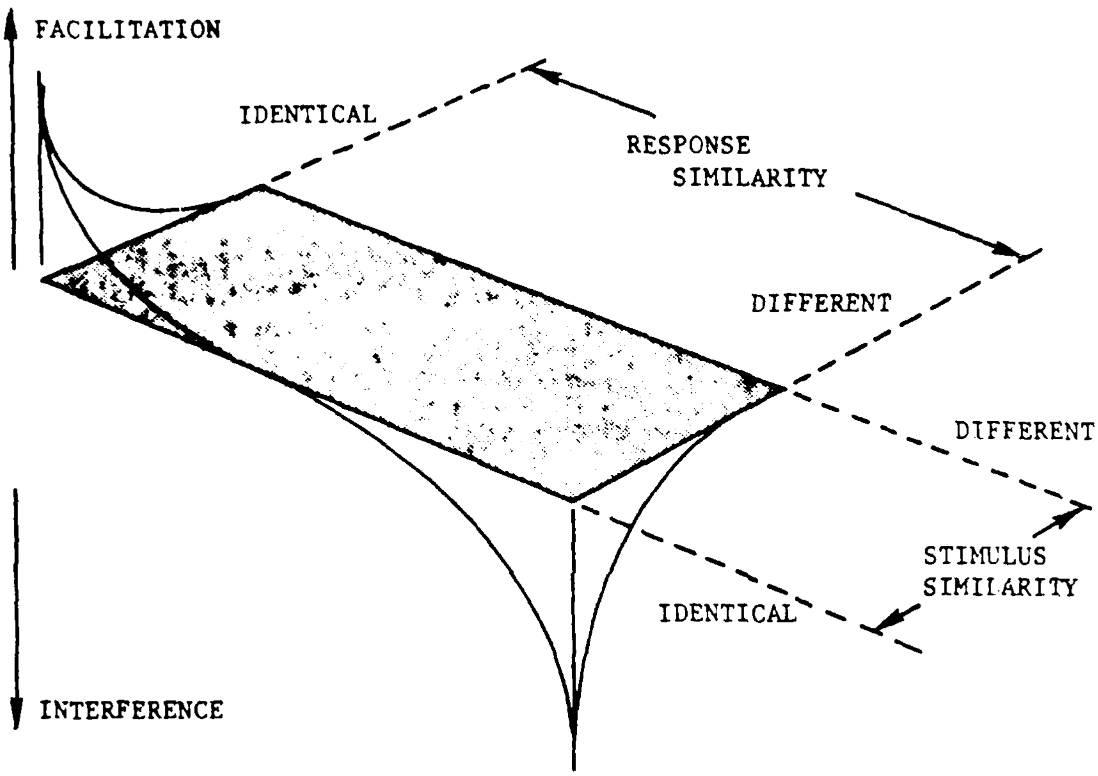

Figure A1-3. Osgood's Transfer and Retroaction Surface

The effects of various stimulus-response relationships between a pair or more of tasks and their relative transfer effect are as follows:

STIMULI	RESPONSE	TRANSFER
Identical	Identical	Maximum positive
Similar	Identical	Positive
Identical	Similar	Positive
Different	Identical	Small positive
Identical	Different	Negative
Different	Different	Little or none

Figure A1-4. Relative Transfer Effect

When the learner is faced with learning similar materials, the danger of interference is highest. Therefore, trainers should take pains to emphasize the difference and distinctions in similar materials. Of course, similar materials can be learned more easily if the transfer effect occurs. Therefore, similar materials are in the polarized environment between interference and transfer.

While interference is the most widely held theory of forgetting, there are other hypotheses about why we forget, perhaps more supplementary than competitive. They include:

a. Trace Transformation. This theory postulates that information committed to memory is transformed or distorted to make it more compatible with previous knowledge and experience. F. C. Bartlett thought memory to be an active process where past experiences are reconstructed according to a "schema," an overall interpretation that we hold. Thus, we distort, eliminate, or invent details to fit the schema. This theory fits nicely with otherwise unexplainable contradictory recollections of high stress experiences such as combat. Although these experiences may have a profound effect on future behavior, stressful training activities such as the recruit's visit to the gas chamber may or may not exhibit schema.

b. Repression Theory. Whereas other theories present forgetting as a process over which the individual has no direct control, Freud hypothesized that we remember what we want to, and repress memories that are painful to us. This is part of his larger view of unconscious manipulations individuals go through in order to hold a favorable self-image.

c. Loss of Access Theory. This hypothesis holds that nothing is really ever forgotten but becomes inaccessible for a number of reasons. Older experiences are temporarily lost, buried under newer experiences. Often, older people will spontaneously recall memories from childhood, sometimes with remarkable clarity. This theory's strongest argument is in the seemingly unexplainable recollections caused by electrical stimulation of the brain during surgery.

d. Change of Set Theory. This theory is not proposed to stand alone, but experiments have shown that sometimes memory fails because the stimulus situation at the time of attempted recall differs from that at the time of original learning. Chapman, et al., (1967) state, "there is even experimental evidence that verbal materials learned in one room tend to be less well remembered in a different room...."[5] These findings could also be interpreted to support the associative stimulus-response theories of learning by considering stimulus in a larger context.

Short-term and Long-term Memory

Up to this point, memory has been discussed as a single entity, but

quoting Ruch and Zimbardo (1971):

"Whatever the exact neurological mechanisms involved, there is general agreement that we have at least two different memory systems and perhaps more. There seems to be a short-term retention of sensory information which differs in important ways from long-term memory storage and may involve different neurological processes and even different parts of the brain."[6]

It may be useful to view the memory system as being divided into perceiving, encoding, storing and retrieving functions. Perceiving starts with stimuli triggering nerve impulses from receptors. Being often bombarded with stimuli, only part of which will be eventually encoded, there appears to be a sensory storage subsystem. For example, viewing a strobe light with a duration of one-thousandth of a second triggers bio-electrical activity that persists some two hundred times as long.[7] Studies by Sperling led him to conclude tentatively that we have a nearly total visual storage subsystem although it exhibits exceedingly rapid decay. Information must be classified or organized in some meaningful way and transfered to our long-term memory storage subsystem if it is to be retained for more than a few seconds. However, once the information is verbally classified it appears to persist several seconds longer in the short-term memory. All in all, information in short-term memory is extremely vulnerable to decay and/or crowding out by competing stimuli.

This linear memory system concept says that nothing can get into long-term memory storage except through short-term memory and the gate is successful encoding. Ruch and Zimbardo comment:

"Several factors help to get the information transfered from the first system, where the rate of loss is great, to the second, where it is relatively more persistent. The likelihood of information getting into long-term storage is greater the smaller the amount of material presented, the more novel it is, the more actively it is rehearsed, and the greater its significance for the individual's orienting to and coping with environmental demands. Unfortunately for those of us who hate commercials, much information that is of no value to us gets stored in very long-term memory because it meets these criteria.... Consider: I'd walk a mile for a _______."[8]

Chunking

A popular and seemingly profitable area of current scientific inquiry is the notion of memory units, clusters of information in long-term memory that tend to be learned and remembered or forgotten in a block. These

blocks are referred to as chunks. For example, verbal information can be viewed in a hierarchical context where phonemes represent the lowest order. Patterns of phonemes form words, the next hierarchical level, and patterns of words form sentences. The quarterly maintenance of a military vehicle can be arranged in a hierarchy just as well. The speed with which something will be learned, and the relative permanence with which it will be retained, is obviously a function of where the learner is with respect to the hierarchy of the material. George Miller's work with chunking strongly suggested that there is a stable number of units a learner can absorb with one exposure. The range of units was five to nine, or as Miller said, seven, plus or minus two. Several other investigators have found consistent results. For example, Furakawa experimented with chunking among learners with varying cognitive processing capacities. His research found chunking in a programmed instruction delivery system to be best for all subjects in both immediate and delayed post tests.[9]

<u>Learning and Retention Techniques</u>

Ruch and Zimbardo state that:

> "All learned skills...involve three features: (a) organization of sequences of motor movements or symbolic information or both, (b) a given purpose - that is, some goal or desired target state toward which the sequence is directed, and (c) corrective reactions based on feedback from the consequences of previous responses."[10]

Chapman, et al., (1967) offered suggestions for effective studying, primarily improved motivation and attitude. A specific method for verbal learning is self-recitation, which the authors state "is believed to be of value largely because it helps us to organize the material and make it more meaningful." Distributed practice is recommended over the single equivalent study period. They recommend viewing material to be learned as a whole first, again to assist in organization of the material. The learner is advised to look deliberately and habitually for relationships with things already learned to capitalize on the transfer effect. Further, they argue for a comfortable study setting, free of distractions.

Chapman, et al., conclude:

> "Some methods of acquiring skills are more effective than others. The person who teaches others or trains them in skills needs to know and understand the important factors in acquiring skills.... A trainer ought to...provide clear standards of performance. It is difficult--if not impossible--to learn a skill if we do not know the criterion for which we are aiming. We need to know when we are doing well and when we are

doing poorly. Indeed, we should know in what particular ways we are doing well or poorly. A trainer should break the task down into elements.... The trainer should provide clear and specific standards for each of these.... The trainer should...improve our motivation. One way of enhancing motivation is to clarify the goals and objectives.... Sometimes learning curves ...motivate learning.... We frequently compete against ourselves, trying to better our previous scores.... Many educators feel that general praise and reproof are ineffective. What is needed instead is to identify specific accomplishments by praise and specific mistakes by criticism. A general atmosphere of approval is something different. A trainer can approve of our efforts while still pointing out shortcomings that need correction."[11]

Silverman (1970) offered nine principles of learning, calling them useful generalizations and stating "...while there may be an occasional dispute, most of these principles are acceptable to representatives of the theories...."[12] The nine principles are:[13]

a. The learner learns what he does.

b. Learning proceeds most effectively when the learner's correct responses are immediately reinforced.

c. The frequency with which a response is reinforced will determine how well the response will be learned.

d. Practice in a variety of settings will increase the range of situations in which the learning can be applied.

e. Motivational conditions influence the effectiveness of rewards and play a key role in determining the performance of learned behavior.

f. Meaningful learning, that is learning with understanding, is more permanent and more transferable than rote learning or learning by some memorized formula.

g. The learner's perception of what he is learning determines how well and how quickly he will learn.

h. People learn more effectively when they learn at their own pace.

i. There are different kinds of learning and they may require different training processes.[14]

J. M. Stephens proposed the following considerations to guide the trainer:

a. Intention to learn: Deliberate intention to learn indicates the learner is clearly aware of what he is expected to absorb. Stephens cites research to support intention as not only a great aid to learning but to learning that is less subject to interference.

b. Ego-involvement: By this Stephens proposes that failure at the assigned task would lead to some impairment of the ego, or reduction in the learner's sense of self-worth.

c. Frequent tests: Stephens' position is that frequent tests are valuable as a motivational device.

d. Objective knowledge of results: Stephens says clear knowledge of how well one is doing has a definite effect on performance or output. This feedback must be prompt, even if it means trainees evaluate their own progress from a model when that is possible.

e. Standard to be attained: Stephens says "to an enormous extent we do what is expected of us." Therefore, this motive can be used to affect output.

f. Periodic reinforcement: Quoting Stephens, "Reinforcement should be applied with as little delay as possible. It is not necessary that reinforcement be applied after every single act. For purposes of *retention*, as a matter of fact, we may find sporadic reinforcement superior to regular reinforcement."

g. Meaning and structure: Conclusions of this author were that the trainer should present the general pattern first so that additional material is presented in the context of the established pattern. The trainer should stress relationships.

h. Avoid interference: When presenting training where the same stimuli will call for different responses, Stephens suggests the new and interfering material not be introduced until the older material has reached a reasonable strength.

i. Distributed practice: Stephens states, "We can be reasonably sure that almost any reasonable way of spacing the practices will give some advantage."[15]

Anderson and Faust's review of research findings on learning and retention synthesize into the following applications for the trainer.

a. Objectives: "Perhaps the most convincing argument for unambiguous, behavioral objectives is that these may have a direct effect on

student learning.... There is some evidence...that giving students a detailed statement of instructional objectives can markedly reduce the time required for learning."

b. Reinforcement: "Reinforcement techniques are among the most useful methods...for arranging and maintaining the behaviors that give birth to learning, such as attentive behavior and persistent behavior."

c. Corrective Feedback: "Research indicates that knowledge of results is more effective when it contains information about what the correct response should be, rather than merely letting the student know he is wrong."

d. Motivation: The authors hold that motivation must be developed by arranging the frequency and contingencies of reinforcement.

e. Spaced Review: "Repetition, further explanation, additional practice, and review have a greater impact if these activities are spaced over a period of time instead of massed at one time and place."

f. Organization: "Clear organization facilitates learning, perhaps because the organizing concepts help the student to consolidate detailed information. Previews, outlines, and summaries have all been demonstrated to increase learning and retention."[16]

Although one could go on to quote other researchers, it seems appropriate to consolidate the ground that has been gained. While on the surface the five lists exhibit differences, on closer examination there is significant commonality of thought. The factors of skill acquisition offered by Ruch, et al., provide relatively consistent themes. The key words are organization, purpose, and corrective feedback. "Purpose" is interpreted to imply meaningfulness, motivation, and reinforcement. A purpose or goal by definition is meaningful to its owner. The very process of isolating a goal from the spectrum of meaningless activity carries an inherent motivation to achieve that goal. Progress toward or final achievement of a goal is positive reinforcement. Finally, corrective feedback implies practice, for it is only from practice that feedback can occur. Taking these liberties with the factors of Ruch, et al., the following chart displays conclusions about correlations between the authors:

RUCH'S FACTORS	SILVERMAN'S PRINCIPLES	CHAPMAN'S SUGGESTIONS	STEPHENS' SUGGESTIONS	ANDERSON'S GUIDELINES	SYNTHESIS
PURPOSE/GOAL, MEANINGFULNESS	6) MEANINGFUL MORE PERMANENT AND TRANSFERABLE	CRITERION OBJECTIVES, STANDARDS FOR ELEMENTS		BEHAVIORAL OBJECTIVES, MEANINGFULNESS	OBJECTIVES, CONDITIONS & STDS, MEANINGFULNESS
REINFORCEMENT	2) REINFORCEMENT	RECITATION MAKES MEANINGFUL, REINFORCING ATMOSPHERE	PERIODIC REINFORCEMENT	REINFORCEMENT	REINFORCEMENT
MOTIVATION	5) MOTIVATION KEY ROLE	MOTIVATION/ATTITUDE PRIMARY, PERFORMANCE FEEDBACK	EGO-INVOLVEMENT, INTENTION TO LEARN	MOTIVATION	MOTIVATION
ORGANIZATION	7) LEARNER'S PERCEPTION	STUDY WHOLE FIRST, SEEK TRANSFER	GENERAL FIRST, SUBSEQUENT MATL INTRODUCED IN STRUCTURE, STRESS RELATIONSHIPS	ORGANIZATION	ORGANIZATION
FEEDBACK	1) LEARNER LEARNS WHAT HE DOES 3) FREQUENCY 4) PRACTICE IN A VARIETY OF SETTINGS 5) LEARN AT OWN PACE	DISTRIBUTED PRACTICE, RECITATION IS PRACTICE	FREQUENT TEST, DISTRIBUTED PRACTICE, OBJECTIVE KNOWLEDGE OF RESULTS	CORRECTIVE, FEEDBACK SPACED REVIEW	DISTRIBUTED PRACTICE W/ PROMPT FEEDBACK (IMPLIED TEST IMMEDIATELY FOLLOWING PRACTICE)
	6) DIFFERENT PROCESS	CONDUCIVE SETTING			

Figure A1-5. Skill Acquisition Correlations

APPENDIX 2

Evolution of Task Selection Criteria

In a very general sense the majority of jobs in the Army fall into one of two broad categories. The first is the combat arms. The second is the service and support personnel of the combat support and combat service support branches. The distinction is that the latter generally perform the same tasks in peacetime that they do during war. Conversely, in peacetime the combat arms soldier trains for his ultimate tasks in a more or less simulated environment. However, there is another distinction. Normally, the process of defining tasks which compose the service or support job is relatively straightforward. For example, it is relatively simple to conclude the tasks associated with the Skill Level 1 cook. The job analyst perhaps starts by examining the equipment, processes, and output. This eventually produces a strawman task list which can then be validated by job incumbents and their supervisors, and modified by management. While management may want to add skills, the decision process is eased because it is relatively simple to assign values to trade-offs. The cost of additional tasks or higher levels of competence can usually be compared to the anticipated value accrued.

However, the combat arms pose a different problem. While the determination of tasks is difficult, the argument on conditions and standards is a matter of painful compromise. Survival and success in combat involves a seemingly infinite array of demands. Predicting the prerequisites to success against that near infinite array of demands leads to descriptions of competence beyond human capacity. The tasks, considered one at a time, are all valid in some given scenarios. The conditions and standards are justifiable, again, in some very conceivable situation. However, the total array of tasks is beyond the capacity of the soldier to learn and retain, even in an unrestricted training environment. Therefore, a painful process of setting priorities and selection begins. Typically, the weight of these decisions causes an escalation to very senior officers of the proponent school. All the 51/49 decisions have been made at lower levels. All the remaining choices are excruciating 50-50 questions with life-death, victory-defeat implications.

The regulatory guidance for task selection comes from TRADOC, as that command is charged to describe the training, both institutional and unit, for every member of the Army. The purpose of this paper is to trace the evolution of that guidance. However, job analysis and task selection are elements of a larger initiative called the "systems engineering" of training.

Even in a highly disciplined training environment such as the military, it is inevitable that any given block of instructor-centered training changes over time. The instructors have good days and bad days. As they get more experienced, they alter their techniques and color their presentations with their own experiences. Thus, given time, two fully conscientious instructors, following the same lesson plan, present increasingly different instruction. For these, and other reasons, instruction tends to change subtly and usually inflate. In a sense, systems engineering was adopted to recapture a precise correlation between the training and the job. Generally, systems engineering begins with job analysis, a process which defines a job in terms of tasks performed.

In terms of regulations, systems engineering began with the 1968 and 1972 editions of CONARC Regulation 350-100-1. This regulation offered the following seven-step systems engineering model:[1]

Step 1. Job Analysis

Step 2. Selecting Tasks for Training

Step 3. Training Analyses

Step 4. Develop Training Materials

Step 5. Develop Evaluation Materials

Step 6. Conduct of Training

Step 7. Quality Control

Step 1, job analysis, consisted of preparing a strawman task list and "validating" it with a wide sample of job incumbents by interviews and surveys. The validated tasks then entered Step 2, the task selection process. All tasks were placed in one of three categories: selected for school training, selected for on-the-job training (OJT), or rejected. The criteria for this categorization were listed with the caveat that they were not all-inclusive. However, additional criteria were neither listed nor referenced, hence the criteria presented probably drove most decisions. Considering the categories in reverse order, a task could be rejected if it met either of the following criteria:

> "a. <u>Task can be performed without further training.</u> Can the average student perform the task adequately without school training? If so, the task should not be selected for training.
>
> b. <u>Task is similar to other tasks selected for training</u>. If similarity exists in the performance requirements of tasks within a duty position, the

factor of duplication of training becomes significant in determining if the tasks should be chosen for school training. For example, a major item of electronic equipment may contain several power supplies. Although each power supply is different, similarity of the performance requirements of each task involved may be such that an individual can be trained to performing the same task on other, similar components without school training."[2]

Continuing, the remaining tasks would be selected for OJT based on the following criteria:

"a. Task is relatively easy to learn. Routine, simple tasks fall into this category, as do tasks which can be learned more efficiently in the job environment than the school environment.

b. Task is performed infrequently and task is performed by small percentage of jobholders. Although essential to the job, some tasks are performed too infrequently or by too few jobholders to justify the expense of school training."[3]

Finally, tasks remaining were automatically selected for institutional training. However, the regulation listed criteria for selection for school training, as follows:

"a. Task is performed by large percentage of jobholders. Performance of a task by a large number of jobholders is a significant factor in substantiating its selection for school training, unless the task is teachable on the job.

b. Task is performed frequently. Frequency is a factor in selection, but some routine, simple tasks are performed so frequently that they are easily learned on the job. Additional criteria, normally, should be used to support selection on the basis of frequency.

c. Task is critical to mission. The more critical the task is to mission accomplishment, the more suitable it is to include it in school training. While task criticality can usually be determined from job analysis, an additional source for determining it is the judgment of experienced jobholders and supervisors, obtained through interviews and questionnaires.

d. Task is essential to performance of other tasks.

Certain tasks per se may not be appropriate for training, yet proficiency performance of these tasks is prerequisite to performing other tasks for which training must be accomplished. For example, the task of disassembling and assembling an item of equipment may very well be delegated to on-the-job training, but the tasks of identifying, removing, and replacing defective parts in that item of equipment might be selected for school training. In this situation, it is necessary to disassemble the item before defective components can be removed and replaced. Thus, the task of disassembly and assembly must be selected for school training.

e. Task is required immediately upon entry into job. If competent performance of the task is necessary immediately upon entry--and other selection criteria also apply--then that task should be selected for school training."[4]

In 1975, TRADOC published TRADOC Circular 350-30, Interservice Procedures for Instructional Systems Development (IPISD). While not regulatory, the circular contained command-approved procedures which included task selection criteria. They were:

"a. Percent performing: The criterion of percentage of job incumbents who perform the task points to the need for training tasks that are most often performed on the job.... If only 10 percent of job incumbents perform a task, there is a strong probability that 90 percent of your training resources would be wasted if you trained all...to perform the task.

b. Percent of time spent performing: The percentage of time spent performing a task is a criterion that points to a need for providing training to assist job incumbents in efficient performance of those tasks on which they spend the most time. Selection of tasks for training based on this criterion offers chances for high payoff in terms of return on training dollars expended.... A computer program...Comprehensive Occupational Data Analysis Program (CODAP), can compute and print out the average percent of time spent by members of the DOS who perform the task, and the average percent of time spent by all members of the DOS....

c. Probable consequences of inadequate performance: The criterion of probable consequences of inadequate performance points to the need for selecting tasks for training that are essential to job performance, when needed, even though the tasks may not be performed

frequently. The consequences of inadequate performance on certain tasks could result in injury to personnel, loss of life, or damage to equipment. Inadequate performance could have a serious impact on the mission, the operation, the product, the equipment, or the operator....

d. Task delay tolerance: The delay tolerance of a task is a measure of how much delay can be tolerated between the time the need for task performance becomes evident and the time actual performance must begin. There are some tasks encountered by job incumbents as part of their normal job in which no delay can <u>ever</u> be tolerated. The job incumbent who encounters the task must be capable of <u>doing it, then and there</u>, without taking time to read how to do the task, or find someone to advise him or take over completely. For other tasks, a delay of a few minutes or perhaps half an hour might be quite acceptable, or even mandatory, while the job incumbent gets advice, checks technical orders, regulations, etc. And for some tasks, there might be time to assemble a group of experts to confer before proceeding....

e. Frequency of performance: While the probable consequences of inadequate performance of a particular task are serious and the task delay tolerance is low, the task might still rate low for training priority if it is rarely performed.... On the other hand, if a task is performed frequently, the pay-off in terms of return on training dollars expended is likely to be great, particularly if there is a known "best way" to perform the task....

f. Task learning difficulty: The learning difficulty of a task refers to the time, efforts, and assistance required to achieve performance proficiency. Some tasks encountered in each DOS are so easy or so familiar that they can be readily "picked up" on the job without formal training. At the other extreme, some tasks are so complicated that a job incumbent can perform them adequately only after lengthy, formal training. Other tasks lie somewhere between these extremes and require different levels of training....

g. Probability of deficient performance: The criterion of probability of deficient performance is used to ensure that training is given in those essential job skills in which job incumbents frequently perform poorly. In any job, there are tasks that are more

difficult to accomplish (or easier to bungle) than others. By tabulating the judgment of knowledgeable personnel regarding the probability of deficient performance, a list of these poorly performed tasks can be produced. Training of these tasks, regardless of their criticality, must be given serious consideration....

h. Time between job entry and task performance: The criterion of the time interval between completion of training and performance of the task on the job has some significance in selecting tasks for training. Here, the determining factors are: a. Whether or not there is a high probability of the graduate encountering the task on the job fairly soon after completing training. "Fairly soon" means, in this context, that tasks encountered within the first year after training would, everything else being equal, be weighed more heavily for selection than those not encountered until one to two years later. b. The predicted or measured amount of decay of the skill that will take place during the time interval...."[5]

The criteria were not all-inclusive, nor would all criteria apply to all tasks. IPISD offered them as candidates only. They recommended clustering like tasks and applying appropriate criteria, weighted according to the best judgments available. Therefore, even in the rigorous IPISD, the selection process was dependent on best professional judgment in the light of appropriate considerations.

In 1976, TRADOC commenced a series of criterion referenced instruction (CRI) workshops using materials authored by the workshop developer, Dr. Robert F. Mager. This workshop was later to become directed "core curriculum" for all TRADOC school staff and faculty development programs. As such, what the workshop said had a direct or peripheral impact on task identification and selection.

Mager's CRI materials first added the critical preliminary step of "performance analysis" to the larger process. Performance analysis is a decision tree which starts with a performance discrepancy and first determines if it is really worth the resources involved in correction. Further, it causes the user to consider all simpler solutions before selecting training as a relevant solution.

The CRI materials also incorporated goal analysis and target population analysis. The former is a procedure to redefine broad goals into observable and measurable objectives. Target population analysis intends to systematically determine what relevant knowledges and skills the trainee population already possesses at entry to training and what characteristics

should be considered in designing new materials.

At the time of this writing, TRADOC has a draft circular prepared for staffing. This TRADOC Circular 351-4 provides the same eight criteria for task selection as published in IPISD. The draft circular makes note of on-going research to determine if a smaller set of criteria will yield adequate discrimination in selecting tasks for training.

There is a body of practitioners who hold that the Army has provided adequate analyses and criteria for task selection. To the extent problems still exist it is largely because of improperly matching the tools to the job at hand. As an example, a TRADOC course was recently revised. The existing curricula provided a strawman task list. A subsequent survey revealed major differences in percent performing among job incumbents in various duty positions. Further, goal anaylsis was needed to clarify some obscure curricula areas.

The degree of differences between duty positions led to an early decision to redesign the course into "tracks". Additionally, there were areas of the job with a history of marginal performance. Thus, performance analysis was used to determine where training would or would not be a relevant solution. Finally, target population analysis determined large segments of incoming trainees already were proficient or near proficient in several training objectives; hence, the course was individualized and self-paced to capitalize on these entry capabilities. In summary, all analysis processes were used. One criterion, percent performing, was used directly, and two others were used peripherally in conjunction with goal analysis (consequences of inadequate performance and probability of deficient performance). All the remaining criteria were not only unnecessary, but their inclusion would have obscured an otherwise clear picture of what to train. However, if at some future date the course were to be arbitrarily reduced with a calculated acceptance of a lesser graduate, the unused criteria would then be relevant.

In summary, the Army has at hand an array of analyses and criteria that would appear to be fully adequate for its training development needs. However, definitive procedures for selecting the appropriate mix of analyses/criteria may be required to bring necessary and sufficient information to bear on the task selection issue.

FOOTNOTES

[1]LTC Michael J. Hatcher addresses this differential resourcing to support the movement from a maintenance level of training readiness to the readiness for combat in his chapter "Methodology for Change," Resource Cost of Training, Army Training Study Concept Paper.

[2]MG Paul F. Gorman, "The Challenge of Army Training," presentation to the Advanced Training Technology Conference of the National Security Industrial Association, Fort Gordon, GA, 17 June 1975), unnumbered handout.

[3]Harold M. Chapman, et al., Psychology: Understanding Human Behavior, p. 286.

[4]Ibid.

[5]Ibid.

[6]Robert F. Mager, and J. McCann, Learner Controlled Instruction, p. 6.

[7]Chapman, et al., pp. 331-332.

[8]Richard C. Anderson and Gerald W. Faust, Educational Psychology, pp. 473-474.

[9]Chapman, et al., p. 325.

[10]Ibid.

[11]Nancy Hibbits, et al., Team Training and Evaluation Strategies: State of the Art, Human Resources Research Organization Technical Report 77-1, p. 10.

[12]Milton S. Katz, "Learning Curves," presentation to Army Training Study at Fort Belvoir, VA, 3 November 1977.

[13]US Department of the Army, Training and Doctrine Command, TRADOC Pamphlet 71-8, Analyzing Effectiveness, p. II-5.

[14]LTG Orwin C. Talbot, "The Modern Battlefield," report to the National Security Industrial Association Conference on Advanced Training Technology, p. 14.

[15]J. E. Holmgren, "TEC Effectiveness Data," unpublished TEC Effectiveness Study, p. C9.

[16]Robert Vineberg, A Study of the Retention of Skills and Knowledge Acquired in Basic Training, Human Resources Research Organization Technical Report 75-10, p. 12.

[17]Joe H. Harless, presentation to a TRADOC seminar on job aid technology, 17 May 1977.

[18]US Department of the Army, Training and Doctrine Command, "Orientation to the Training Development Institute's Criterion Referenced Instruction Workshop."

[19]Harless, presentation to a TRADOC seminar on job aid technology, 16 May 1977.

[20]US Department of the Army, Training and Doctrine Command and Materiel Development and Readiness Command, Policy Statement.

[21]US Department of the Army, Training and Doctrine Command, Interservice Procedures for Instructional Systems Development, Executive Summary and Model, p. 40.

[22]Ivan Horabin, "Maintenance of Performance Effectiveness," unpublished report of a workshop, Alexandria, VA, 9-10 February 1978.

[23]LTC Thomas F. Plummer, telephone interviews between October 1977 and January 1978; personal correspondence, 2 February 1978.

[24]MAJ Henry Langendorf, Chief, Drill Sergeant Task Force, Army Training Board, personal and telephone interviews between October 1977 and January 1978, Fort Benning, GA.

[25]Robert F. Mager and Peter Pipe, Objectives in Criterion-Referenced Instruction: Analysis, Design and Implementation, p. 59.

[26]Robert M. Gagne, "Learning Hierarchies," Educational Psychologist, p. 1.

[27]LTC Paul Ogg, Chief, Training Assistance Division, Army Training Board, telephone interviews and personal interviews between October 1977 and January 1978, Fort Eustis, VA.

[28]Jean Bonette and Robert Hutton, Occupational Survey Report: MOS 71C, Stenographer, US Army Military Personnel Center, summary page unnumbered.

[29]Joyce Shields, US Army Research Institute for the Behavioral and Social Sciences, telephone and personal interviews between October 1977 and January 1978, Arlington, VA.

[30]Milton S. Katz, "Learning Curves," presentation to Army Training Study at Fort Belvoir, VA, 3 November 1977.

[31]Hilton M. Bialek, et al. Personal Turbulence and Time Utilization in an Infantry Division, Human Resources Research Organization Report FR-WD-CA-77-11, p. 9.

[32]MAJ Miles T. Clements, Army Training Board, interview, 20 October 1977, Fort Benning, GA.

[33]MAJ Clarke M. Gillespie, Unit Training Programs, Army Training Study Concept Paper.

APPENDIX 1 FOOTNOTES

[1]J. A. McGeoch, "Forgetting and the Law of Disuse," Psychological Review (1932), cited by Anderson and Faust, p. 433.

[2]Ibid., p. 445.

[3]Ibid., p. 446.

[4]Ibid., p. 449.

[5]Chapman, p. 334.

[6]Floyd L. Ruch and Philip G. Zimbardo, Psychology and Life, p. 241.

[7]Ibid.

[8]Ibid., p. 243.

[9]James M. Furakawa, "Cognitive Processing Capacity and Learning Mode Effects in Prose Learning," Journal of Educational Psychology, p. 736.

[10]Ruch and Zimbardo, p. 220.

[11]Chapman, pp. 323-326.

[12]Robert E. Silverman, "Learning Theory Applied to Training," in Glaser and Otto, p. 106.

[13]Ibid., pp. 106-112.

[14]J. M. Stephens, Educational Psychology, pp. 297-412.

[15]Anderson and Faust, pp. 53, 266-267, 293, 439, 462, 477.

APPENDIX 2 FOOTNOTES

[1] US Continental Army Command, CONRAC Regulation 350-100-1, Systems Engineering of Training, 20 April 1972, p. 2.

[2] Ibid., pp. 16-17.

[3] Ibid., p. 17.

[4] Ibid., p. 16.

[5] US Department of the Army, Training and Doctrine Command, Interservice Procedures for Instructional Systems Development, pp. 113-130.

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RESERVE COMPONENT TRAINING

by

Lieutenant Colonel Peter T. Zielenski

TABLE OF CONTENTS

CHAPTER I

LESSONS LEARNED FROM PREVIOUS MOBILIZATIONS

Introduction

As a world power, the United States must maintain a credible national defense; as a democracy, it must maintain that defense within a system of competing public demands. Since the end of the draft in 1973, manpower costs have risen significantly. To cope with restricted resources and rising manpower costs, the Total Force Policy was developed. This policy changed the role for Reserve Components (RC) from that of providing a backup and expansion force for Active Components (AC) to a role of active participation in the initial total defense effort. This changing role and increased dependence upon RC has made their readiness an ever important concern.

Chapter I will address current RC training and readiness issues through a historical comparison of four relatively recent mobilizations--World War II, Korea, Berlin, and Vietnam--followed by a discussion of lessons learned from a review of five major issues: recruiting, basic and advanced individual training, unit training, training facilities, and materials. Chapter II will discuss the present RC training environment while chapter III will focus on the gap between RC training requirements and capabilities.

During the period between the two World Wars, mobilization planning developed much of the basic documentation and policy that was used for training in World War II, and to some extent up until the start of the Korean War. These early training documents identified in a sequential manner subjects considered as required knowledge for a soldier if he were to perform satisfactorily in combat. With the advent of successive changes in educational technology, Army equipment and tactics, and lessons learned from previous conflicts, these documents were rewritten and revised, leading to today's soldier's manuals (SMs), skill qualification tests (SQTs), and Army training and evaluation programs (ARTEPs).

One of the documents, the mobilization training program (MTP), consisted of daily schedules for training subjects in a desired sequence. There was a different MTP for each type of unit. Based on combat experience, these MTPs were modified not only for prescribed subjects, but also for cycle and program length. Upon mobilization,

the MTPs were extremely valuable to inexperienced trainers, both officer and NCO, because they provided trainers with standardized lessons in a desirable format (essentially lock-step instructional programs). By the same token, this rigidity often hampered the skilled, competent trainer by limiting his initiative and ingenuity. HQ, Army Ground Forces considered the MTPs as training aids rather than inflexible training directives, but this view was not adequately articulated to the field.[1]

The recognition of the importance of training support materials had been well developed by the start of World War II and, once funds were available, large quantities of materials such as maps, charts, films, filmstrips, and models were produced and distributed. The development of training literature such as field and technical manuals, and technical and training regulations proceeded concurrently. Other efforts included development of methods of instruction, MTP, and combat proficiency tests for platoon, company, and battalion-size units. These tests suffered from a lack of combat realism and, hence, did not measure desired combat proficiency or training effectiveness.[2] The Army Ground Forces Test Book of August 1946 cites four reasons for the tests. They provided the basis for instruction, proficiency standards, uniform training, and maintenance of interest in training.[3] These efforts taken collectively resulted from mobilization planning conducted during the inter-war years. Their importance to the discussion of RC training is that these actions formed the basis of training programs and materials used subsequently by the RC during mobilization. The importance of these preparations is even more critical today because of the shorter mobilization times and more complex equipment encountered by the RC.

Table 1, page F-3 summarizes five premobilization and postmobilization issues which impact on RC mission accomplishment. Issues which impact most critically on mission accomplishment are those which exist in the premobilization phase because they determine the readiness condition of organizations on M-Day. Issues that exist in the postmobilization phase are also important because they can influence the ability to correct deficiencies from the premobilization phase.

Recruiting Policy

The first issue to be discussed is RC recruiting or enlistment policy (Table 1, Item 1). Although a solution to RC recruiting challenges is beyond the scope of this paper, one can look at the historical basis of the militia as well as appropriate recruiting and retention policies to assess the impact of recruiting on training. Historically, the militia has been a source of great national strength; however, during the early days of the Republic, it was not voluntary.

FEATURE	WORLD WAR II	KOREA	BERLIN	VIETNAM
PREMOBILIZATION				
1. RC Recruiting	Vol, Not Draft Motivated	Vol, Draft Motivated	Vol, Draft Motivated	Vol, Draft Motivated
2. BT/AIT	Unit	Unit	Unit/6 mos	6 mos
3. RC Unit Training	48 2-hour Drills, AT	48 2-hour Drills, AT	48 2-hour, 6 Multiple, AT	48 4-hour (72 4-hr, AT)*
4. Facilities	Inadequate	Inadequate	Inadequate	Inadequate For Unit Training
5. Material	Extreme Shortages	Extreme Shortages	Quantity Improved Quality Not Improved	Inadequate
POSTMOBILIZATION				
6. % Auth Strength (When Mobilized)	50%	45%	66%	85%
Fill Time	28 weeks	8 weeks	8 weeks	20 weeks
7. % MOS Qualified (When Mobilized)	Low, % Unknown	38%	77%	75%
8. Unit Training Time	120 weeks (to Div Level)	34 weeks (to Div Level)	13 weeks (to Div Level)	16 weeks (to Bde Level)
9. Facilities	Inadequate	Inadequate	Adequate	Adequate
10. Material	Inadequate Until 1943	35% Initially; Improved During Training	80% Within 12 weeks	C4-C1 Within 8 weeks

* Selected Reserve Force (SRF)

Table 1. Selected Mobilization Issues[4]

"Initially, the Militia system in the Colonies was strong and efficient. It was not a voluntary force composed of a few citizens who liked to play soldier; rather, the Militia meant every able-bodied man, within prescribed age limits, who was required by compulsion to possess arms, to be carried on master rolls, to train periodically and to be mustered into service for military operations whenever necessary."[5]

The concept of the mandatory militia disappeared during the early 20th century and was replaced by a voluntary system which included various incentives to join. Prior to World War II, RC recruiting in the US was wholly voluntary. This proved inadequate since many divisions were mobilized at about 50 percent of full strength. In each of the other premobilization periods shown in Table 1, RC enlistment was voluntary but draft-motivated, a fact which provided more satisfactory results. During each mobilization, some filler personnel were called from the manpower reinforcement pool without major problems.

Upon mobilization, the average percentages of authorized unit strength were as shown in Item 6, Table 1. Also shown is the average number of weeks required to fill units to full deployment strength. The mobilization strengths and fill rates shown would generally be inadequate to support most required delivery dates for today's NATO requirements. The 7-month fill rate for World War II was essentially due to the fact that personnel shortages were filled with inductees directly from induction centers which were experiencing quota shortfalls. The 5-month fill rate during Vietnam resulted primarily from slow IRR fill rates.

Today the RC enlistment program is voluntary but not draft motivated. With current levels of incentives, the program is inadequate as evidenced by the shortage of over 100,000 personnel in ARNG and USAR units, an Individual Ready Reserve shortage of about 350,000 enlisted personnel, and a mismatch of required specialities.[6]

Basic and Advanced Individual Training

A second measure for comparison is the method of conducting basic combat training (BT) and advanced individual training (AIT). As shown in Item 2 of Table 1, BT/AIT was conducted in units prior to World War II. Although the exact MOS qualification percentage for World War II was not available, it was low as indicated by National Guard Bureau observers who reported:

"...that 20 percent of the staff and divisional officers were not qualified, that the troops needed squad and platoon problems rather than division and corps problems, and that all troops required at least three months basic training."

The same basic training requirements existed prior to the Korean mobilization, and the MOS qualification percentage was also low. With the passage of the Reserve Forces Act of 1955, completion of BT/AIT was transferred from RC units to the Active training base for completion during an initial 6 months active duty training period. The result of this Act can be seen in the increased MOS qualification percentages evident during the Berlin and Vietnam mobilizations (Table 1, Item 7).

BT/AIT today is still conducted in the Active training base; however, MOS qualification is low when compared with corresponding figures for the Berlin and Vietnam periods. This is due in part to greater weapon complexity, manpower, turbulence, and the use of more exacting qualification tests. The MOS qualification problem is further aggravated by some RC unit redesignations and reorganizations.

Unit Training Time

The next premobilization issue, the amount of authorized inactive duty training (IDT) or drills, and annual training (AT) time (Table 1, Item 3), affects both individual and unit training programs. Prior to World War II, the system differed between the Army Reserve and the Army National Guard. Within the Army Reserve, training consisted primarily of correspondence courses and an annual training period of 15 days for selected individuals. In any year, only about 20 percent of the Reserve officers attended annual training due to fund limitations. Within the Army National Guard, the premobilization training program consisted of forty-eight 2-hour drills and an annual training period of 15 days. The 2-hour drills were inadequate to provide the qualified individuals and units required for mobilization.[8]

The amount of training time improved after World War II and, at the time of the Korean mobilization, Army Reserve units were authorized varying numbers of paid drills plus 15 days annual training. The Army National Guard continued its training program of forty-eight 2-hour drills and 15 days annual training. Notwithstanding this level of training, both programs were still restricted by shortages of funds, facilities, and equipment. The net result was that some planners concluded that premobilization training prior to the Korean conflict was inadequate and essentially provided no savings in mobilization time.[9] Of course, there was still a substantial reservoir of personnel with World War II experience.

The amount of inactive duty training prior to the Berlin call-up increased significantly. The Army Reserve and the Army National Guard operated under a program of forty-eight 2-hour assemblies, a minimum of six multiple assemblies (weekend training assemblies), with 15 days of annual training. Participation in this training was higher, reaching 80-90 percent of assigned strength. The training level varied from unit to unit with most units in platoon or company training. Multiple unit training assemblies (MUTAs) were conducted at the ARNG armories or USAR centers and

occasionally at nearby weekend training sites. At the completion of their mobilization training cycle, units involved in the Berlin mobilization were considered ready for deployment. Although some time had been saved through premobilization training, the exact amount is undetermined.[10]

Following the Berlin mobilization, two-hour unit training assemblies (UTAs) were extended to four hours; and, prior to the Vietnam mobilization, most were conducted at weekend MUTAs instead of weeknight UTAs. The initiation of monthly MUTAs had an important impact on recruiting by allowing expansion of the unit recruiting area since more time was available for travel. As shown in Table 1 (Item 8, Page F-3), except for Vietnam, post-mobilization training time improved through successive mobilizations, but the time actually required for training was longer than that anticipated by mobilization and deployment plans for that period. Today, the RC training program consists of forty-eight 4-hour assemblies, plus two weeks of AT. The 48 UTAs are still normally conducted as one MUTA-4 per month.

The amount and division of available time for training has been an issue of continuing review as successive administrations sought improved readiness. One significant variation was the increase of training time by formation of the selected reserve force (SRF) (Table 1, Item 3, Vietnam). The SRF was formed on 30 September 1965 by the Secretary of Defense as a "super ready" force. The purpose of the SRF was to improve US defense posture by raising the readiness level of selected reserve units to a very high state without actual mobilization.[11] These units were allocated 100 percent manning and equipment, necessary logistical support, and up to 72 UTAs per year in addition to AT. Although initial results of the SRF program showed units were attaining high readiness levels, the additional training requirements imposed on these units reflected adverse trends in unit morale and retention of personnel. As a result, with the formation of SRF II in 1968, training time was reduced to 58 UTAs.[12] A noteworthy point which surfaced in interviews with SRF personnel was that although they devoted additional time to training, they were given no corresponding benefits, nor was there an increase in the ceiling on the amount of retirement points that could be earned.[13] Furthermore, the pace was too intensive for many dedicated individuals who could not give more time to an avocation competing with family and civilian job pressures.

During the Vietnam mobilization, the majority of units called were from SRF II. In spite of the increased training which these units received, there was no appreciable change in readiness when these units were mobilized for Vietnam.

> "The two brigades started training on [illegible] May. The premobilization estimate called for an [illegible]-week basic unit training (BUT) and advanced unit training (AUT) program for both brigades. A re-evaluation of the status of the brigades subsequent to mobilization resulted in a revised estimate of a 13-week program...

for the 29 Inf Bde, and an 11-week program...for the 69th Inf Bde.

The 29th Inf Bde completed its 9-week BUT on schedule but it required an extra 4 weeks (8 weeks total) to complete AUT, making a grand total of 17 weeks. Brigade-level exercises were not conducted until November and December. Consequently, the brigade did not successfully complete operational readiness tests until the end of 1968 and was rated combat ready some 7 months after mobilization.

The 69th Inf Bde required 10 weeks to complete BUT rather than the planned 7 weeks.... A 3 week AUT program began on 3 August, culminating in a brigade-level exercise. Battalion training tests were completed by 24 August, about 15 weeks after mobilization."[14]

The SRF program was terminated in 1969. Conclusions drawn from the SRF project are inconclusive, but they indicate that units attained some undefined level of improved readiness. However, this readiness level was difficult to maintain due to morale problems caused by the intensity of increased training.

"Two competing implications seem clear. First, if RC units are to achieve during peacetime a higher readiness goal than...company level...some significant amount...of extra training during IDT is required. Second, extra training in the amount of 10 to 24 extra 4-hour drill periods per year for every man in the unit exact a high toll in morale and is likely to prove excessive and counterproductive in the long run."[15]

Several other factors, such as reorganizations just prior to mobilization, new equipment, and personnel turbulence, also may have affected the readiness of these units.[16] Another conclusion drawn from SRF activities suggests that it is necessary to determine more accurate measurements of readiness in order to optimize the available time for each unit to train. Finally, the problem of morale is not difficult to understand when it is remembered that reserve activity, even if draft motivated, is primarily an avocation. The problem is particularly critical for young officers and NCOs since they are attempting to advance in their civilian [illegible] in addition to meeting their unit and family obligations.

[illegible], a similar phenomenon is surfacing as increased turbulence and [illegible] appear to be developing in affiliated, as opposed to [illegible]. Further study of this observation is ongoing, and [illegible].[17]

Facilities and Material

The last two issues from Table 1 on Page F-3 concern the inadequacy of training facilities and materials during each mobilization. First, there was a general lack of adequate facilities for premobilization training which can be traced through all four mobilizations. This included administrative and maintenance buildings, training areas, and secure storage areas. In Item 9, Table 1, for World War II and Korea, it should be noted that some mobilization stations had no facilities to support the type of training required. As a result, such facilities were either constructed or units were moved to available training support. The Berlin and Vietnam mobilizations did not face this problem, partly because of better management in selecting mobilization stations and partly because of the smaller size of the mobilization. The condition of current premobilization training facilities has also gradually improved due in part to better OMAR fund management.

Second, there was a lack of modern equipment available for training throughout each of the selected mobilizations. Although this condition progressively improved from one mobilization to another, it tended to become better for high priority units and worse for the lower priority, nonmobilized units. This was easily explained in that "...units were often required to give up equipment to meet the needs of higher priority units."[18] A specific situation of this type is cited in a recent Army War College paper:

> "Equipment was taken from them and sent to Vietnam. Additional equipment that they were to receive was withdrawn or diverted to meet requirements in Vietnam. Training suffered from the lack of equipment."[19]

This maldistribution continued from late 1964 through 1975 as noted below:

> "Up until the present time, the perceived need to make National Guard and Army Reserve units combat ready rapidly has apparently never been strong enough to warrant appropriation of adequate funds to ensure that sufficient equipment is on hand to equip Reserve Component units properly for peacetime training, and to bring them to wartime authorizations without delay on mobilization. Similarly, sufficient funds for provision of truly adequate peacetime, training sites and facilities have never been provided."[20]

Although shortages of modern materials and tactical equipment did not improve immediately upon mobilization (Table 1, Item 10, Page F-3), improvement did occur more rapidly in each successive mobilization period. Current planning continues to attempt to overcome deficiencies in facilities and equipment. One example of such an effort took place recently

in Army Readiness Region V with the development of weekend training sites in and around large metropolitan areas such as Chicago, St. Louis, and Minneapolis. Another example is the issue of new or updated artillery equipment such as M109A1 howitzers to RC units. However, despite such initiatives, sufficient resources to improve equipment, training sites, and facilities have still not been provided. In fact, equipment issue can be a mixed blessing. In some cases, it has been exceedingly difficult to maintain properly the equipment provided since the necessary logistic infrastructure (motor pools, shops, etc.) was not present and maintenance personnel manning levels had been drawn down.

Summary

Within this chapter, five major issues have been reviewed which impact on Reserve Component peacetime training as it progressed throughout mobilization for World War II, Korea, Berlin, and Vietnam. Several lessons learned should be considered in any attempt to improve RC training:

a. Recruiting in a nondraft environment has not been a satisfactory means of enlisting personnel in the Reserve Components unless adequate incentives are provided. These incentives should be designed not only to stimulate initial enlistment, but also to encourage sustained training proficiency.

b. Basic combat training/advanced individual training for Reserve Component soldiers is most effective in providing qualified soldiers when it is conducted by the Active training base.

c. More accurate methods for the measurement of unit level training readiness need to be developed.

d. A comprehensive program should be implemented to improve RC training facilities for both IDT and AT. This may include much more extensive use of Active Component facilities.

e. Programs currently underway to improve and modernize equipment, training materials, and support for RC training should continue and they should be focused on specific mobilization contingency requirements.

Despite many improvements in training, the lessons learned from previous mobilizations essentially have not been corrected today. Clearly, unless new approaches are undertaken to improve RC training programs, the Army National Guard and Army Reserve will be unable to accomplish the mission expected by their Nation and their fellow Active Component soldiers-in-arms.

CHAPTER II

RESERVE COMPONENT TRAINING ENVIRONMENT

Introduction

In chapter I major problems were identified which impact on RC training and which have remained essentially unchanged since World War II. In this chapter the current Reserve Component training environment will be reviewed to complete the RC training picture. Initially, the review will focus on the Army National Guard and Army Reserve command and control structure and its influence on training. Resources and constraints which affect training will be reviewed, followed by a discussion of the RC training management system and the physical requirements of the training environment as seen by the RC unit commander. Finally, current RC training programs will be addressed.

Command and Control Structure

The total strengt of the National Guard and Army Reserve is expected to approach 570,000 in FY 1979, compared with an authorized strength of approximately 600,000 (400,000 National Guard, 200,000 Army Reserve). Total RC strength at present is about 543,000. The Guard and Reserve wartime strength is planned at approximately 700,000.

At the Department of the Army staff level, the Army National Guard (ARNG) and Army Reserve are represented by separate staff elements, the National Guard Bureau (NGB) and the Office of the Chief of the Army Reserve (OCAR) respectively.

The National Guard Bureau is a staff agency responsible for the regulation of manpower, equipment, and funding authorized by the Department of Defense for the Army National Guard. The NGB coordinates directly with the Adjutants General of each State on these matters. Although the NGB advises the Army Chief of Staff on ARNG matters and participates with other Army staff agencies in the formulation and development of DA policies affecting the ARNG, the major functions of the NGB in the area of training are limited to the submission of recommendations to the Departments of the Army and Air Force concerning ARNG training, and the promulgation of approved training directives. DA staff responsibility for developing individual and unit training policies and procedures for Active Army, ARNG, and Army Reserve forces currently rests with the Deputy Chiefs of

Staff for Personnel and Operations and Plans respectively.[21] However, based upon a recent decision by the Chief of Staff of the Army, DA staff responsibility for all AC and RC training policy will be vested in the Deputy Chief of Staff for Operations and Plans.

Each State National Guard is commanded by the Governor of the State through the State Adjutant General. National Guard units are frequently directed to conduct domestic support and civil disturbance/disaster preparedness training programs which, while contributing to various State responsibilities and local recruiting efforts, detract from mission-oriented combat training. The majority of RC combat units, to include some combat support and combat service support units, are within the ARNG. Approximately 70 percent of Army National Guard personnel are assigned to combat units.[22]

The Office of the Chief of the Army Reserve (OCAR) is the Army Reserve counterpart to the National Guard Bureau. Similar to NGB, the OCAR staff serves as the DA advisor on Army Reserve affairs but it must coordinate its actions with Army Reserve units through CG, Forces Command (FORSCOM) who commands and is directly responsible for the training of these units. FORSCOM directs the Army Reserve and provides training assistance through the CONUS Armies, Army Readiness Regions, and Readiness Groups similar to that provided for the ARNG. These headquarters in turn manage the Army Reserve units through either Army Reserve Commands (ARCOMs) or through General Officer Commands (GOCOMs). These ARCOMs and GOCOMs command the Army Reserve brigades, groups, battalions, companies, and detachments placed under their control.

In contrast to the ARNG, the majority of RC combat service support units are located within the Army Reserve, although there are several combat units in the structure. Approximately 80 percent of Army Reserve personnel are assigned to combat service support units.

The Army Reserve also provides 12 US Army Training Divisions and 2 separate AIT brigades. These units currently have a premobilization mission of providing assistance in MOS training while their postmobilization mission is to augment existing Army Training Centers or to operate new ones for the conduct of initial active duty training.[23]

Still another element of the Army Reserve are the USAR schools which present the US Army Command and General Staff College Course to eligible RC and AC personnel from all Services and to DA civilians. Branch officer advanced courses are taught to Reserve Component officers only. USAR schools have the capability to teach the branch officer basic courses but limited student density does not warrant these courses. Other courses offered include MOS qualification courses; NCO leadership and Noncommissioned Officer Education System courses; nuclear, biological, chemical defense courses; and instructor training courses. The USAR schools conduct these courses locally at more than 900 locations during AT. There

are in excess of 80 USAR schools located in the United States, Germany, and Puerto Rico. Student load varies from year to year, but is normally in the range of 50,000 students.[24]

In addition to RC units, another important element of the RC structure is the Reserve Component Personnel and Administration Center (RCPAC). This organization is designed to provide the large numbers of officer and enlisted replacements required to bring AC and RC units and installations up to full operational wartime strength, and to provide wartime replacements required for combat casualties. As noted earlier, the Individual Ready Reserve (IRR) is currently short about 350,000 personnel. Management of the IRR is performed by an automated personnel and reporting system designed to furnish required mobilization data for filling AC/RC unit personnel requirements. Requirements which cannot be filled are passed to MILPERCEN for further action. Based upon current policy, filler personnel will arrive at their mobilization stations about 28-30 days after the mobilization alert. In an effort to reduce this lead time, the Army first instituted a voluntary program for reassignment of IRR personnel to units. This program has recently been withdrawn, and a test is planned for involuntary preassignment of these personnel to units.[25]

In regard to the supervision of RC training programs, the Active Army has the responsibility to establish and evaluate training standards. This responsibility is administered through FORSCOM, the Continental US Armies (CONUSAs), Army Readiness Regions, Readiness Groups, and unit advisors directly to ARNG units (Figure 2-1, Page F-14).

The existing structure of three CONUSAs and nine Readiness Regions under FORSCOM is a result of the STEADFAST reorganization of June 1973. STEADFAST eliminated 3d and 4th Army Headquarters at Fort McPherson, GA and Fort Sam Houston, TX respectively. Fifth Army Headquarters was relocated from Fort Sheridan, IL to Fort Sam Houston, TX. Concurrently, STEADFAST reduced staffing by approximately 50 percent in 1st, 5th and 6th Army Headquarters.

Simultaneously, STEADFAST established nine Readiness Regions with subordinate Readiness Groups geographically located to advise and assist ARNG and Army Reserve units. The CONUSA headquarters was assigned command of USAR units as well as responsibility for assisting in the training of RC units in their respective areas. This mission involves management of the advisor and assistance efforts in the Readiness Regions/Groups, and involves coordination on an area basis of the resources required to support RC training.

A recent OSD decision (DPS 059/058) reduced Army management personnel of the Guard and Reserve in the CONUSAs and Readiness Regions by 25 percent for a total reduction of 1000 military and civilian spaces. The basis of this decision, effective in FY 1979, stems from a September 1975 DOD report which directed the Army to examine integration of Active and

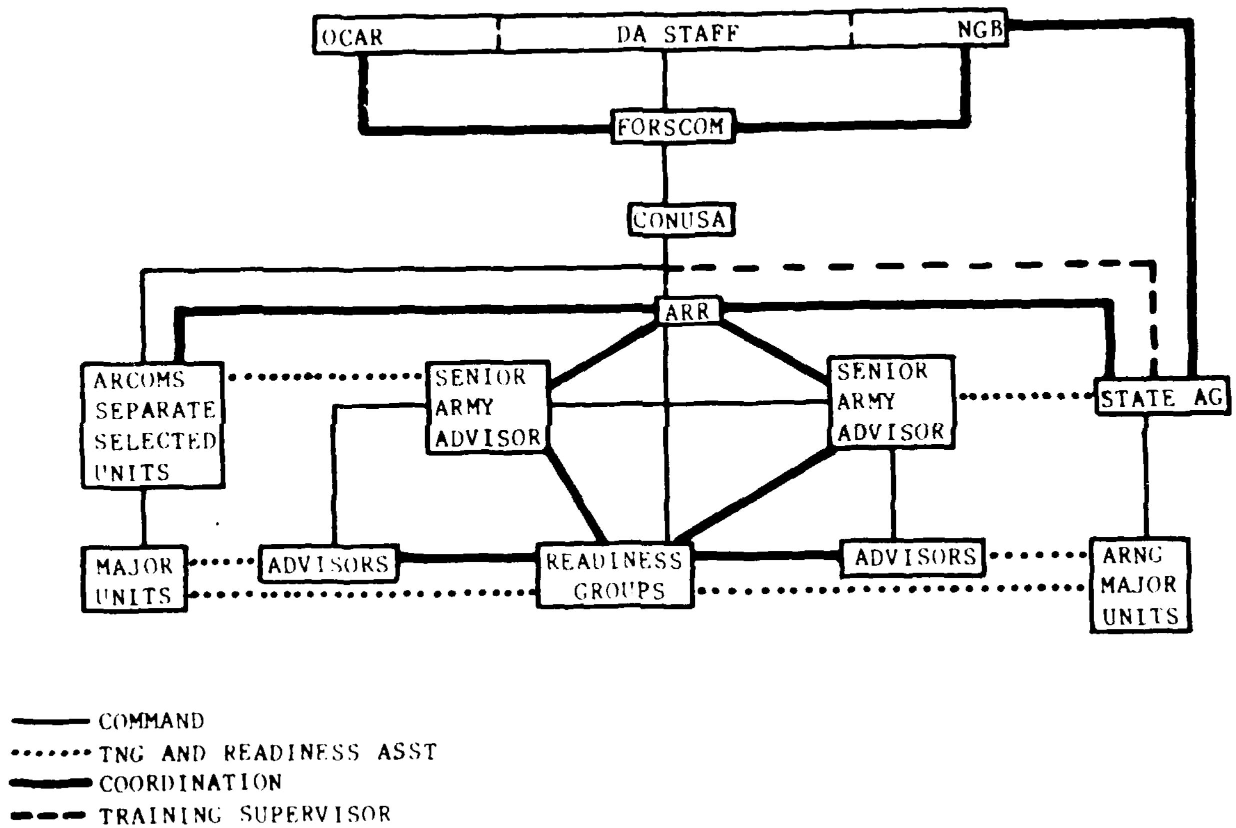

Figure 2-1. RC Organization for Training

RC forces beyond the current affiliation program. Specifically, a conceptual plan is to be developed to use the wartime chain of command for supervising peacetime training, readiness, and operational planning.[26]

Constraints

In chapter I the problem of constrained resources was mentioned briefly. More elaboration will now be made on the adverse impact which restricted resources and other constraints have on the present RC training system.

Time is one of the most critical constraints. The Something-for-Nothing (SOFONO) Study recently conducted by the Sixth Army highlights the training time problem while simultaneously providing insights into personnel constraints.

> "The Reserve Component has only 38 days in which to do what the Active Component does in approximately 260; train, maintain and administer. In other words, the Reserve Component soldier spends about as much time working with the Reserves as a fairly dedicated hobbyist spends on his hobby; in many cases, less. Moreover, unlike the Active Component soldier who lives where he works, the Reserve Component soldier may commute one or two hundred miles to his monthly training, and his commander may supervise units spread over most of a state (one commander, for example, must travel over 1200 miles to visit subordinate units and supervise their training)."[27]

Notwithstanding these unique challenges, there are other requirements which further reduce the number of RC training days available for mission training. These demands include recruiting, inspections, administrative duties, travel to distant training areas and equipment storage sites, preparations for AGI, and clean-up activities after annual training. As a result, the unit commander and his technician appear to spend approximately 75 percent of their time on other than mission-related training.[28]

Personnel constraints are another consideration. Unlike reservists in any other country, the US reservist must be prepared to undertake a global mission, employing extremely complex equipment. To meet these requirements demands an enormous amount of time from an individual whose primary concerns must be with his family and civilian occupation. To meet ARNG or Army Reserve requirements, for example, the reservist spends a minimum of one weekend per month training and may well also spend an additional weeknight at a staff training assembly preparing for the weekend. He also spends two weeks per year at annual training, frequently at the sacrifice of his vacation time. Many Americans are not willing to make such sacrifices, so it is understandable that the RC encounters difficulty

with recruiting and retention. Likewise, it is a tribute to those who are willing to pay the price to remain in the Guard and Reserve.

On the positive side of the personnel picture, there are some military assignments which the reservist can do extremely well, perhaps in some cases better than his AC counterpart. These jobs are those that are directly related to an individual's civilian occupation. Examples include Reserve military policemen who are members of the local police force, the communications platoon wiremen who are employees of the telephone company, or the Reserve combat engineer platoon composed of members of the State highway department road crew. Virtually all examples fall in the area of combat service support skills. This comparability of civilian and military skills serves to relieve some of the pressure on training time and can enhance recruiting and retention.

On the other hand, in the critical combat-related skills there is virtually no civilian counterpart skill. This serves to increase the amount of training required to bring the individual up to a requisite skill level. This problem is further complicated by the increasing complexity of the equipment being introduced into the force. Not only does it take longer to learn the equipment, but the requirement for refresher training is greater in order to maintain proficiency. For some types of equipment, it may be virtually impossible for the reservist to maintain an acceptable level of proficiency with one drill per month. For example, if the Radar operator must practice 12 to 16 hours every week to maintain combat ready status on the AN/MPQ-4A, counter-mortar Radar, the present RC training system cannot accommodate combat-ready equipment proficiency on this system on a continuing basis.

The crucial problem of finding dedicated people willing to spend the required amount of time becomes particularly critical in attracting and retaining the leadership element--officers and key noncommissioned officers. The type of individual the RC requires is the very one, both in [illegible] and motivation, who is going to be concerned with advancing himself in [illegible] civilian career. Increasing the time demands of RC duties can be counterproductive in attracting and retaining the right people. Likewise, [illegible] [illegible] to the quality and [illegible] of the time [illegible] [illegible] [illegible]ries.

Turbulence is another aspect of personnel constraints. Reserve personnel turbulence has been estimated at between 30 and 40 percent annually [illegible] [illegible] as high as 50 percent in some units. Part of the problem is due [illegible] normal transience of the American public. When an RC soldier moves [illegible] changes jobs, he may also [illegible] his reserve status. This results in the lowering of unit strength and increased pressure on recruiting, both of which take time away from training. For example, it has not been unusual for units in the past to stop training and devote two or three months a year to recruiting. Paradoxically, the time taken from training for recruiting sometimes causes turnover rates to increase since an active

training program attracts and retains soldiers. Recruiting detracts from quality training as leaders' efforts are diverted from preparation of training. The solution to the RC recruiting and retention problem is being closely studied by the Army staff to include the results of a reenlistment bonus test.[29] It may be necessary to initiate some type of formal incentives program, enlistment/reenlistment bonus, or tuition assistance to help realize necessary strength levels.

The net result of turbulence is that units tend to be constantly faced with the problem of having to integrate new people and to concentrate on relatively low-level skills. Not only is this a limitation on the level of collective proficiency which the unit can reach, but commanders and staffs must constantly focus on individual training at low skill levels rather than developing their own essential tactical and leadership skills. This focus is particularly misdirected since the individual skills being trained could be trained relatively rapidly in the event of mobilization, whereas the collective tactical skills for commanders and leaders can only be developed over a relatively long period through cumulative experience.

With respect to fiscal constraints, the major problem is the availability of funds to send personnel to resident courses of instruction, to conduct unit schools, and to attend other formal educational activities. Interviews conducted with NGB/OCAR/FORSCOM budget management personnel indicate that this activity has been funded at about half the level of recognized requirements over the past four years.[30] However, RC units generally seem to be able to train effectively within the restrictions placed upon them with respect to POL, ammunition, and maintenance. The ability to conduct unit training within established limits is based on lower level training and the commander's management of his training activities to remain within allotted funds. The problem of the availability of school funds is presently solved simply by setting priorities in school requirements, filling as many spaces as funds allow, and treating the remainder as unfilled requirements. A partial solution to the problem is better utilization of those personnel trained in resident courses, and closer management of funds.

The STEADFAST reorganization brought a closer relationship between Active and Reserve Components, resulting in considerable emphasis being placed on one standard for evaluation of AC and RC alike despite the time, personnel, and fiscal resource constraints described above. The concept is valid but it was initially not understood in view of the relatively limited resources available to RC units when compared to AC units. This misunderstanding led to expectations that RC units would be able to reach and maintain identical readiness levels as AC units. This problem has now been recognized with the forthcoming incorporation of the two-level ARTEP (vice three-level ARTEP), more flexibility in meeting triennial RC ARTEP requirements, and the publication of a change to current regulations which places RC training readiness objectives in a broader context based more on

deployment times than on fixed readiness requirements.[31]

Still other constraints affect RC units. The super critical nature of training time highlights the divergent responsibilities of the Army National Guard with respect to its State activities. This frequently detracts from the limited time available for the unit's Federal mission training. Domestic action projects for example, such as construction of school playgrounds, can contribute to community relations and development but, if not properly supervised, they can be very disruptive to unit training programs. Furthermore, natural disaster missions can provide excellent focus to a unit but these are unforeseen and therefore disruptive to organized individual and collective training.

Another constraint which should be mentioned is equipment shortages.

> "At the start of Fiscal Year (FY) 1976, the Army National Guard had an equipment mobilization requirement of \$6 billion (FY 76), a training requirement of \$4.5 billion (FY 76), but had only \$3.5 billion of equipment (FY 76)....
>
> The FY 77 data for the Army Reserve reveals a mobilization requirement of \$2.68 billion, a training need of \$2.58 billion, but only \$1.39 billion of equipment on hand...."[32]

If units are expected to raise their level of training proficiency, they need the necessary equipment to train with or they must have adequate simulation devices as a substitute. They also need to train on equipment with which they will fight. The RC today is still faced with the need for these items. Because of probable equipment distribution programs such as the tank fleet variations (XM-1 to the M48A5), the situation will likely not improve for the long term. The fact that RC units store much of their equipment in centralized equipment pools at major training sites offers a partial solution to availability of equipment for training at those sites. Conversely, this same situation creates problems for the unit that must train at its USAR center or NG armory or at close-in training sites since it has little of its equipment available. This storage requirement also creates equipment maintenance problems for the RC unit commander. Equipment constraints require further study as a continuing RC training problem.

The large number of unit reorganizations and redesignations each year present another training constraint. Due to the problems of maintaining adequate strengths and proper force structure balance as well as the desire to improve staffing, unit reorganizations have hindered training programs, reduced readiness, and even lowered strengths. During CY 1977 for example, based on 1R/2R reports, unit commanders have indicated approximately 660 ARNG company-sized units had major reorganizations. This

amounts to 18 percent of the total number of ARNG units.[33] When the reorganization involves a change in unit mission, such as a change from Engineer company to Artillery battery, the impact on training is even more severe.

Finally, geographical constraints should be noted. In a general sense, the effects of geography vary in their impact on RC training. In the Western and Southwestern States, distances hinder RC training, while in the Northern States, weather reduces the amount of outdoor training that can be accomplished. In the Eastern States, the heavily urbanized areas limit the number of available RC training sites. As an example of distance restrictions, 49th Armored Division units in Texas are separated by as much as 800 miles from east to west and by 840 miles from north to south, thus making division command and control operations very challenging. Administration of SQT activities over large areas is difficult, as is the time loss due to the distance 49th Armored Division personnel are required to travel to reach a training site. Current regulations allow 25 percent of the training time to be used for travel which means that local training sites are generally required. To obtain maximum benefits from use of Active Component and other major training facilities, many units schedule a MUTA-5 and begin training on a Friday. If this can be done and the sites are available, the problem then becomes how to get the mechanized equipment to training areas.[34] The difficulties involved in this operation often lead to much of the training being conducted in a static situation.

As indicated by all these factors, many RC constraints are not only unique to these forces, but they present training challenges much greater than those present for the Active force. This, and recognizing that approximately 50 percent of the Total Force is comprised of Reserve Components, would justify increased priority of training support materials to the Guard and Army Reserve. Further, the current emphasis on developing training devices and aids for the combat arms first, followed by the combat support and combat service support, compounds the uneven distribution of these important materials for the RC. As an example, self-paced instruction has been taught in service schools for several years, but it is only this year that the pilot test of this concept is being accomplished in the RC through USAR schools.[35]

Comparison of Training Management AC/RC

Another factor that will assist in understanding the RC training environment is a discussion of the primary difference between AC and RC training management systems--the presence of full-time training management personnel. Within the Active Component battalion, the battalion commander, operations officer, and company commanders function as training managers. In accomplishing their duties, they must confront turbulence problems, the demands upon unit time which detract from training time, and, to some extent, problems of available training facilities. There

are several methods used for the organization of AC unit training programs, one of which is discussed below.

One effective company-level training program is the T-Week program used by the 7th Infantry Division. The week in which training takes place is designated T-Week; however, the conduct of suitable training during T-Week is dependent upon a series of actions which must take place in the third (T-3), second (T-2), and immediate (T-1) week prior to T-Week. The effectiveness of T-Week training is a direct reflection of how well the complete series of actions have been planned and executed. Thus, this program is an example of a systematic approach to company-level training management under the close supervision of the battalion. It should be noted that proper preparations for this program are complex and time-consuming even with appropriate full-time personnel.[36]

These personnel are not present in an RC unit. When AC and RC company organizational structures are compared, one of the major differences is that there is no full time RC training manager. At battalion level, the RC commander functions as his own training manager but has a staff training assistant (STA) to conduct day-to-day training management activities.[37] However, the RC company commander, while also functioning as his own training manager, has only a full-time administrative and supply technician (AST) to assist him. The AST does not provide effective training management assistance because his own workload involves other activities, such as company administration and supply, which divert his attention from training. Thus, the RC company commander has the dilemma that while training is emphasized at crew and platoon levels, an effective (full-time) training management capability is located only at battalion level. Additionally, the STA must conduct training management activities for all companies in the battalion. He may have to travel 200 miles to visit a subordinate element, arrange training schedules that occur on different weekends, and ensure that equipment and training materials are operational and ready at each training site. If effective training is to be conducted at company level, it must be managed at company level with supervision and guidance from the battalion. This is particularly important to maintain RC [illegible] current TRADOC emphasis on decentralized training, as put forth in TC 21-5-7 and FM 21-6. In recognition of this company-level deficiency, Congress has authorized a one-year training readiness NCO test [illegible], effective 1 Jan 78, in both Guard and Army Reserve companies. Anticipated results of the test are expected to be more efficiently managed unit training programs, better and more interesting training, increased retention, and enhanced recruiting.

Physical Aspects of the Training Environment

The training environment is also influenced by physical aspects of RC training facilities. These facilities generally consist of a unit armory, close-in training sites which permit limited field training, weekend training sites of greater capability, and annual training sites of varying

quality. Also included are appropriate training support materials, such as training extension courses (TEC), TV tapes, etc. The adequacy of these training facilities can best be determined through the perceptions of RC unit commanders as reported on their 1-R FORSCOM Report of Yearly Training Evaluation. Data shown in the following three figures represent average values of RC company-size units as reported by FORSCOM for AT 77.

ITEM	FACILITY	ARNG	USAR
1	Small Arms Ranges for Qualification	13.0	14.4
2	Crew Serve Weapons Ranges MG	37.0	43.6
3	Crew Serve Weapons Ranges AT	57.2	50.0
4	Crew Serve Weapons Ranges TK	66.3	59.1
5	Crew Serve Weapons Ranges MTR	49.8	48.2
6	Crew Serve Weapons Ranges (FA/AD)	51.2	63.6

Figure 2-2. % IDT Ranges Inadequate

Figure 2-2 shows that most RC units have small arms ranges for IDT training, but only about half the units have adequate ranges for crew-served weapons qualification.

AD-A184 394 ARMY TRAINING STUDY· CONCEPTS OF THE ARMY TRAINING SYSTEM(U) ARMY TRAINING AND DOCTRINE COMMAND FORT MONROE VA F J BROWN 08 AUG 78 SBI-AD-F000 102

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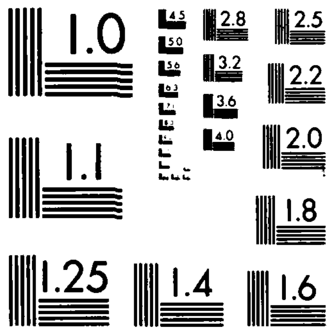

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

ITEM	FACILITY	ARNG	USAR
1	PLT/SQD/SEC Tactical Dismounted	5.4	8.4
2	PLT/SQD/SEC Tactical Mounted	15.3	16.3
3	CO Tactical Dismounted	10.3	12.8
4	CO Tactical Mounted	22.3	21.8
5	Area/Facility for conducting maintenance operator training on major unit equipment	4.3	9.6
6	Adequate facility to store equipment/vehicles	10.3	15.6

Figure 2-3. % IDT Maneuver Training Areas Inadequate

Figure 2-3 shows a corresponding increase in the percentage of inadequate maneuver areas as the size of the unit increases. A factor which contributes to the inadequacy of mounted tactical training areas is the environmental restrictions placed on the use of tactical vehicles. Despite such problems, considerable progress has been made in the overall improvement of these facilities, especially when one considers that in 1968 most units had no, or very few, company-level training areas.

ITEM	TRAINING MATERIAL	ARNG	USAR
1	Availability of training devices/aids	4.1	5.0
2	Training Manuals/ Soldier's Manuals	17.7	7.1
3	ATPs, ATTs, or ARTEPs	6.9	8.0
4	MTOE/TDA	1.5	3.4
5	FMs	4.1	3.1
6	TCs	2.4	2.3
7	Training Aids	2.3	4.7
8	TEC Equipment	13.9	13.4
9	Gaming & Simulation Equipment	25.6	35.1
10	TV Trainers	25.2	28.7

Figure 2-4. % Training Materials and Regulations Inadequate

The shortage of manuals reflected in Item 2 of Figure 2-4 for the Guard is probably due to the fact that ARNG companies do not receive pinpoint distribution. Unlike Army Reserve companies who do receive pinpoint distribution, ARNG companies receive their documents from higher headquarters based upon a battalion distribution plan. The shortages in TEC, gaming and simulation equipment, and TVT (Items 8-10) probably reflect the newness of these systems.

Another aspect of the physical training environment is the training area requirement for combat, combat support, and combat service support units. Combat units require attack ranges, small arms and crew-served weapon ranges, and maneuver areas for mounted and dismounted training to include field fortifications, camouflage and concealment, and other combat skills. Combat support units require small arms and crew-served weapons ranges, bridge sites, artillery ranges, and maneuver areas for mounted training as well as for the establishment of position areas.

Combat service support units have unique requirements because their

early deployment mission limits their postmobilization training. Therefore, they must be able to train in an environment which not only takes advantage of their services, but allows operations under tactical field situations. An example of this training is the Scenario Oriented Corps Area Training System (SOCATS) which provides a scenario-driven tactical command post exercise.[38] The dual advantage of this training is that it places combat service support units in a field training situation while utilizing their services in a support role. This exercise also allows these units to conduct ARTEPs in a most realistic training environment.

A final element of the training environment is the RC training program itself. RC training begins with the requirement for the individual to complete basic training and advanced individual training. Both training programs are currently provided by the Active training base, although some MOS training is provided as retraining or sustainment training by USAR schools and training divisions. Training is also accomplished by the use of vocational technical schools (VOTEC) through contracts established by the USAR schools. Because of the long lead time to establish these contracts, they may not be used to full advantage. Several initiatives are underway in an attempt to exploit these training assets during premobilization and to examine their feasibility as postmobilization training facilities. One test is being conducted in a Johnstown, PA VOTEC high school during FY 1978-79.[39] This program is oriented to high school seniors who enlist in the Reserve or Guard and complete their MOS training in their senior year at the VOTEC high school.

Current Training Programs

Unit training programs include both inactive duty training (IDT) and annual training (AT). Current directives specify that IDT training will be conducted with maximum emphasis on mission-essential training in a field environment. The constraints discussed earlier in this chapter dictate that maximum advantage be taken of resource-conserving training materials during IDT. The training during IDT emphasizes individual training, although some collective training is conducted with emphasis again on resource-conserving materials such as the use of subcaliber devices for field artillery or armor training. Noticeably absent in IDT, however, are mobilization training programs as evidenced by findings in MOBEX 76 that RC units sufficiently understood basic mobilization and deployment procedures.

During AT the primary emphasis is on collective training which focuses on full system capabilities. Individual training during AT generally takes place as integrated classes taught in conjunction with other activities or as formal classes which cannot be presented except at AT. In this respect, the level and quantity of training vary from unit to unit. A relatively new program conducted during AT to enhance training realism is OCONUS deployment training. Under this program, selected RC units conduct AT in the overseas theater to which they would be assigned in wartime.

This program is currently limited to battalions and smaller units, and it provides realistic mobilization training for units with an early deployment mission. A similar program conducted during AT is the Gaining Command Program which envisions tentative wartime assignments for D to D+60 AC and RC units to a gaining European Corps or Communications Zone Headquarters. Every third year the RC unit would conduct AT in their actual deployment location. During the two intervening years, AT would focus on the deployment mission. Both programs should have a degree of recruiting and retention potential since they offer the incentive of training in Europe during AT.

The last aspect of unit training programs is the authorization of additional training assemblies (ATAs) which are utilized for two major purposes. First, unit commanders use this additional time to complete training preparations. Second, ATAs are used to combat additional officer and NCO classes for specific type training programs such as SQT orientation classes. This training could also be used for professional competence and leadership training such as the conduct of war games. Because of the limited number of ATAs available, most are devoted to training preparations for the next MUTA. The practical limit to ATA increase is probably the time reservists can spend away from jobs or family rather than ATA funding. This practical limit may have been exceeded already in affiliation, and particularly round-out, units.

The discussion thus far has centered on training in RC units. Perhaps a greater challenge exists for training in the IRR, a source intended to provide 67 percent of the manpower requirement upon mobilization. It is from this manpower pool that fillers for both AC and RC units will be furnished. Because of difficulties with strength shortfalls in RC units and the IRR, an RC Revitalization Act has been prepared and forwarded to DOD. While the Act may serve to attract new accessions to the IRR, it creates a very difficult training problem, both premobilization and postmobilization, of how to train nonprior service personnel introduced directly into the IRR.

One approach to training the IRR is currently being tested by the Reserve Component Personnel and Administrative Center (RCPAC). This program foresees counterpart training in which individual members of the IRR are attached to an Active Component unit/activity to perform duties in accordance with their specialty, and to gain exposure to current doctrine, tactics, and equipment. The tours may involve such assignments as: school staff and faculty, special field and joint exercises, indoctrination training, attachment to Active Army headquarters and units for MOS training, or special assignments pertaining to Army Reserve Program projects including support of AT sites. Due to the effectiveness of this program when applied to officers as a part of the OPMS-USAR program, it may also be appropriate to the EPMS-USAR program when it is developed in the IRR. Assignments in this program are determined between the individual and each professional management officer based upon speciality development,

refresher or sustainment training, unit experience, and development of other specialities.[40]

Other training possibilities existing within the IRR are Reinforcement Training Units and Mobilization Designee Detachments. US Army Reserve Reinforcement Training Units are nontroop program units organized to provide training for nonunit members of the US Army Reserve. Personnel attached to these units participate in a volunteer nonpay training status, and receive retirement point credit only. These units may be organized to perform training in accordance with a training program prescribed for TOE or TDA units. Units performing training based on a prescribed training program will be organized according to the appropriate TOE/TDA at cadre level. Although more resources might be required to develop this training, it is worthy of further study because it could furnish trained officers and NCOs to flesh out units to enable 24-hour operations. These units could also form the nucleus of cadre staffs for new units.

A second alternative for IRR training is the Mobilization Designee Detachment consisting of mobilization designees who volunteer to participate in inactive duty training (IDT in a nonpay status). Retirement points are given for attendance at each training assembly. No organizational structure is prescribed; however, the detachment should be organized to facilitate mission training.

The value of the IRR must be fully recognized not only as a system for obtaining wartime fillers and replacements, but also as a trained, skilled manpower pool. The difficulty is that the pool strength has not been maintained and those personnel still in the IRR are not properly trained for the duties they would be expected to perform. Design of appropriate responsive training programs for IRR personnel is a priority training requirement.

Summary

This chapter has reviewed the Reserve Component command and control structure within which the training system functions. It discussed various resources and constraints impacting on RC training, and then it compared the unit training management system between Active and Reserve Components. The chapter concluded with a discussion of the physical aspects of the training environment and current Reserve Component training programs.

CHAPTER III

ALTERNATIVES FOR RESERVE COMPONENT TRAINING

Introduction

In chapters I and II, issues which impact on reserve training challenges were discussed from a historical perspective, as well as from a perspective of the situation which exists in the reserve training environment today. In chapter III, a total training analysis approach will be proposed to assist in development of realistic alternatives which can be used to assist in bridging the gap between requirements and capabilities currently placed on the Reserve Components.

The training situation of the Army Reserve and Army National Guard can best be addressed within the context of the total RC environment utilizing a methodology called "Total Training Analysis." As the name implies, this approach addresses more than training and training programs because it includes the results of training, resource inputs, nontraining activities, and requirements which compete with training for resources.

ARTS Methodology

The Army Training Study descriptive model is the basis for analysis. As shown in Figure 3-1, the model can be entered at any point depending on the needs of the user. Beginning at the left, the model links resources, which include people, dollars, and time, with training programs. The training programs, categorized as institutional training and individual and collective training in units, are the prime determinants of training proficiency. Proficiency in the areas which are critical to success in combat establishes the unit's combat effectiveness as influenced by training. It is necessary to bridge the gap between training proficiency and combat effectiveness by various verification techniques which include independent evaluation, instrumented battlefields or ranges, and war games. These techniques are not all available now, but they are imminent.

There are two distinct periods which should be addressed in any analysis of requirements for training the Reserve Components to combat effectiveness: premobilization and postmobilization. The distinction should be made because there are dramatic differences in the training

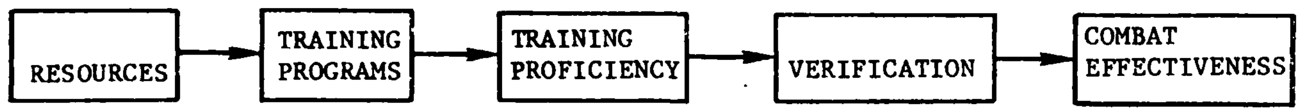

Figure 3-1. ARTS Model

environment during these periods, and because the training proficiency which can be achieved in one establishes the proficiency which should be maintained in the other. At the end of postmobilization training, the unit must have the proficiency required to accomplish its mission. To achieve this, the Army should maintain the Reserve Components at a "steady-state" of proficiency which will permit achievement of the skill levels required for success on the battlefield within the limitations of the postmobilization training environment. This steady-state proficiency is the Reserve Components' premobilization training goal. Theoretically, it drives the training program and training resource requirements for Reserve Components.

The existence of two training goals (steady-state and combat), and the radical differences between the premobilization and postmobilization training environments, require two iterations of the ARTS methodology. The first addresses the postmobilization situation and the standards required for effectiveness in combat. The second is applied to the premobilization situation and the requirement to maintain the steady-state proficiency defined by the postmobilization iteration.

The 95% Battlefield

The goal of RC training is to attain a winning level of training proficiency just prior to entry into combat. Standards which define the goal must be referenced to the anticipated combat environment and enemy. For the Reserve Components, the battlefield which allows the shortest lead time and presents the greatest threat is Central Europe.

Should war occur in Central Europe, it will be the most sophisticated conflict the world has seen. Both sides possess equipment which is technologically very advanced and which provides a capability for extremely rapid and destructive combat. Increased ranges extend the horizon of warfare to distances heretofore unthinkable. New night-fighting capability makes round-the-clock combat a very real probability. The destructive power of new munitions is such that, in most cases, it is true that what can be seen, can be destroyed.

The potential enemy will conceivably outnumber US forces in personnel and weapons, and be backed by equal or better technology. Since he can expect to have the initiative which accrues to an attacking force, he can mass his combat power at the time and place of his choosing to achieve nearly overwhelming local superiority in numbers.

All of this means that the US Army must be able to react on very short notice and fight on a battlefield where victory will require a very high proficiency in those skills which are key to success and survival. The Army must be able to perform the critical skills at a very high level of proficiency and to employ its equipment to the very limits of that equipment's designed capability. Thus, the Army must be prepared to fight

on what has been termed the "95% Battlefield.' Standards of training proficiency must be referenced to this 95% Battlefield.

This requirement is the same for both Active and Reserve Components. They will fight the same enemy on the same battlefield. The same levels of proficiency spell the difference between victory and defeat for either one. However, there are two primary differences. Prior to mobilization, resource constraints, and particularly time, make it much more difficult for Reserve Components to achieve required readiness standards. Upon mobilization, with the exception of combat service support and other selected units which deploy immediately, Reserve Components will have a somewhat longer time to prepare for entry into combat.

Proficiency

As discussed earlier, the RC premobilization training environment is extremely challenging. To achieve the necessary level of proficiency, the number of required skills and tasks must be vigorously scrubbed, reducing them to the absolute minimum so that training can focus on truly essential tasks.

Having distilled these tasks to the bare minimum, the second requirement is to focus on the postmobilization period. There is an analytical requirement to determine the available formal training time within various deployment schedules. This effort could be a logical extension of the methodology of the Battalion Training Model developed by ARTS. Pending completion of this analysis, MOBEX experience indicates that RC units can be tentatively divided into three categories. Units deploying before D+10 can expect no time dedicated solely to training. Between D+10 and D+30, it is estimated that approximately one-fourth to one-half of the available time could be committed to training, while beyond D+30 about one-half or more of the time could be dedicated to formal training.[41] These time limits pose an extremely difficult training challenge. Thus, it is essential that all time be managed intensively to extract the greatest possible amount for training. Maximum benefit must accrue from the very limited time available for formal training and from opportunities provided by the application of new training methods and technology.

Knowledge of the time required to relearn key skills, and comparison with available training time, will determine the number of skills in which training of one form or another can be accommodated and the corresponding increase in proficiency which can be achieved. These factors establish the minimum starting point for postmobilization training. The steady-state proficiency, which should be maintained on a continuous basis if the unit is to enter combat at an acceptable skill level, defines the training goals for premobilization training programs.

With premobilization goals established, the ARTS analysis process is repeated for the peacetime training environment. Time, the constraining

resource, will place limits on the numbers of types of skills which can be maintained at an acceptable proficiency level. These proficiency limits must be expanded by intense management of time to ensure that critical training or other activities can be conducted. Within the time available for training, there must be a system to provide the greatest training benefit possible. This must consist of realistic approaches which are feasible within the limits of the RC peacetime environment.

In summary, the foregoing process will reveal the extent to which the Reserve Components can be expected to achieve requisite proficiency standards by the time they are scheduled to enter combat. Even under optimistic conditions, there will likely be a shortfall for some RC units whose present missions demand a higher level of skill on a large number of tasks. For such units, training capability may be enhanced by providing more resources in the form of additional instructors and advanced training support material. There may be a need to provide other resources, such as more full-time training, administrative, and logistics personnel. The application of additional training and nontraining resources is subject to the law of diminishing returns since the constraint of time both prior to and after mobilization limits the practicality of resource enrichment solutions. Further, increasing peacetime training has its limitations due to nonmilitary commitments.

Requirements, Capabilities and Shortfalls

Where shortfalls still exist, it may become necessary to formally delete certain combat missions for some RC units. For example, an RC Engineer battalion, after coordination, might be relieved of the requirements to conduct its fixed bridging and vertical construction missions and to focus on more critical training for high priority missions anticipated by the gaining overseas commander.

In cases where RC units still cannot attain an appropriate level of training proficiency, it may be necessary to change the force structure. There may be type units which cannot maintain the required proficiency within the Reserve Component environment. If so, the need for such units must be met from the Active Army, with the appropriate RC units converting to type units whose training proficiency can be maintained within available resources. With this background, a discussion can be made of RC training requirements, capabilities, and shortfalls.

The reality of preparation for mobilization and competent performance after mobilization places many difficult requirements on the Reserve Components. Some of these requirements approach the limits of the capabilities of the RC unit while other requirements exceed their resource limits of dollars, people, and time. Consider, for example, the training requirements of a combat service support (CSS) unit in both environments, the steady-state peacetime preparation role and transition in mobilization to an active wartime mission.

For a CSS unit to have cost-effective training in peace, it must have a well-planned training program that reflects its current training status, the existence of an active "hands-on-training" mission, consumers of the unit's mission work products, and adequate personnel fill. To determine the current level of RC training proficiency, the CSS unit is beginning to employ ARTEP philosophy and diagnostics. This is not an easy function due to the challenges of conducting mission training outside of the annual training period. The problem is compounded because a viable consumer is not always available to measure the quality of the unit's mission outputs. Often the CSS unit is geographically separated from units it should normally support. If such units were near, they would improve the soldier's manual performance of individuals. However, in those cases where a viable consumer is convenient, the tasks which are exercised in providing support may not be the critical tasks needed during post-mobilization. For example, the RC CSS unit must provide its services to support equipment, organizations, and doctrines that will be in use during mobilization. Without specific focusing toward critical tasks, the CSS unit capabilities will not be optimized. This is particularly true for GS maintenance battalions whose varieties of skills are frequently underutilized by consumers in peacetime. However, greater participation of these units in OCONUS training programs has alleviated the problem somewhat and simultaneously increased the readiness of supported AC units overseas. Finally, the very contemporary problem of unit fill must be satisfied before the CSS unit can become an efficient user of training time. The portion of IDT expended upon recruiting and constantly re-starting proficiency training will allow the CSS unit to accomplish only a few very basic tasks during IDT and only fundamental collective training during AT.

The transition to mobilization expands the training requirements of the CSS unit by introducing several new concepts. The actual proficiency of the unit must be evaluated in terms of the deployment mission. Rapid "train-up" programs should be initiated to realize fully the capabilities of un' personnel who are at various levels of training proficiency. The influx of fillers compound the CSS unit's evaluation and training time management programs. Personnel entering the unit after mobilization from the IRR need diagnostic analysis to determine individual proficiencies. Self-paced individual programs should be available to support the unit during this transition. Then collective training must be conducted to integrate newly assigned personnel. The CSS unit must now focus its entire resources upon combat effectiveness diagnosis and corrective training to assimilate the new missions and equipment it will support in the combat theater.

Requirements placed on a CSS unit with a D+30 mission can be analyzed using the ARTS model and "Total Training Analysis." The CSS company's steady-state training mission is based on a few basic elements. Critical, threat-oriented SM/ARTEP tasks, conditions, and standards provide the starting point for determining training requirements. The SM/ARTEP, with

some modification, may be able to provide not only essential tasks, but also training resource requirements.[42] Provision must be made for diagnostic individual and collective testing to determine the level of training proficiency. This will be related to learning/decay rates and subsequent frequency of retraining required to sustain proficiency in essential tasks. Finally, the time and dollar cost of exportable training packages applicable to the CSS unit training situation must be incorporated in the total training requirements analysis.

The commander of the CSS unit will quickly realize that many variables influence his requirements. The effects of personnel stability/turbulence on individual/collective proficiency will play a large role in determining how much training he must conduct in his 38 training days per year. Similarly, if he is training very perishable tasks, he must plan his entire year around retraining to maintain proficiency in these perishable skills.

The geographical area his company draws upon for new recruits will also vary training requirements. If the company has recruiting access to mechanics, electricians, and other types of tradespeople, training requirements are minimized. In many CS and CSS companies, tradespeople are actively sought to reduce the training and retraining required to maintain proficiency. However, the CSS company may be geographically situated in an agricultural region where certain civilian-related skills are difficult to recruit. In any event, the proficiency of RC units is dependent in varying degrees upon civilian skills, and any draft deferment policy should recognize this contribution to unit readiness for very rapid deployment.

Additionally, the availability of training resources will drastically vary the quality of training. Ammunition, fuel, repair parts, availability of CSS training simulators, training areas, and mission-related work will vary in different CSS companies. The existence of exported training support packages can help resolve some of the resource problems, but TDY funds for mobile training teams from proponent schools vary cyclically and, consequently, the proficiency of CSS companies will vary in a corresponding manner. The CSS commander cannot predict all the equipment his unit will use in mobilization, nor can he predict how his deploying company will assimilate new or enhanced capability equipment. This provides the commander with a difficult gamble: should he use his very limited training time to achieve proficiency on locally available mission-related equipment or should he attempt to devise a training strategy to assimilate new equipment that will be issued from POMCUS/War Reserve Stocks? The CSS commander is further hampered by the existence of very few training devices and simulators that he can use to maintain technical proficiency during IDT and AT. This also reflects an additional training burden during mobilization because few time-saving methods of training have been engineered and validated.

The need to incorporate rationalization, standardization and interoperability (RSI) training with ongoing programs poses another challenging training requirement for the CSS unit. Mobilization could result in the unit supporting a NATO corps. This is doctrinally possible and increasingly likely in view of the present serious attempts to improve RSI operations. This creates a training problem which will require the CSS unit to receive substantive support in terms of doctrine, techniques, methodology, and exportable training packages.

In mobilization, the CSS unit must ascertain its mission assignments and initiate a program to move from its premobilization state of proficiency to a level consistent with threat-oriented criteria for success. Training requirement planning must provide training for individual replacements from the IRR or other sources.

The requirements for refresher training for previously assigned and filler personnel must be managed in an environment which includes unit movements, high competition for training facilities, and meager proponent school support. RC personnel will be replacing many active duty soldiers in the training base. This transition will detract from the service schools' ability to provide important training support. Yet, the capability to refresh CSS units by intensive, focused, individual, and collective task training packages is essential to provide proficiency improvement and sustainment as the CSS company awaits deployment. Who can provide this sophisticated postmobilization training support?

The requirements cited for the CSS unit with a D+30 mission can be extended to combat and combat support units by varying the intensity of the requirement and allowing slightly more training time in mobilization. While the basic elements of information needed by the trainer and commander on the ground remain the same, variables which affect training will change for different type units. Commanders and trainers should be provided with peacetime steady-state objectives that will allow rapid transition to a mobilization proficiency level. This in turn permits RC units to become tough, competent winners in combat. However, the method for estimating training requirements as outlined above is presently embryonic, and the quality of RC training management varies across the Nation. Thus, the need to measure proficiency and accurately report readiness needs further refinement.[43] When that need is met, significant resources will be required if RC units are to achieve an acceptable steady-state of proficiency.

In addition to the above requirements and shortfalls, there are special considerations which should be addressed for selected units. Aside from their mobilization training mission, ARNG units have duties and responsibilities to their State. Although these duties are accomplished in "State status," and are, therefore, in addition to the unit's 48 assemblies and 15 days of annual training, they can contribute adversely to the commitment of the NG soldier and units by interfering, as already mentioned, with the time available to satisfy civilian occupational

requirements. This additional pressure will impact on mobilization readiness through personnel losses required by civilian job pressures. Some State missions, if properly supervised, can provide valuable training. A Military Police company, which assumes responsibility for the security of a county prison complex during a strike by civilian guards, is receiving mission-related training and learning to apply skills during periods of high stress which, on occasion, can approximate the tensions of combat. The unit has the advantage of performing a mission similar to its normal tactical mission for a period that may exceed the normal AT period. Conversely, a Field Artillery battalion activated to operate a metropolitan fire department would be fragmented city-wide to man the different fire stations. This would allow no similarity with the unit's mobilization mission, even though it would permit development of organizational competence (tactical readiness) and the leadership climate. Such a mission would contribute only marginally to the unit's readiness unless portable training simulators were available in sufficient numbers to maximize use of idle time in the fire stations. While these State missions are valid duties, innovation is required to increase the training time for units and their respective training readiness for mobilization missions.

As another consideration, although the Guard and Reserve are an avocation to its leaders, they are required to perform with their units during IDT and AT, as well as continue their military education through USAR schools or correspondence courses progressing through officers' basic and advanced courses, Command and General Staff College, and the War College. Individual officers may be very dedicated in meeting this requirement, but these demands on their time may be counterproductive. A study of realistic training requirements for RC leaders is needed. This study should address officer training using the total training analysis approach working back from the critical performance and behavior required of a leader.

USAR Training Divisions present a different challenge. Upon mobilization, these units would augment existing Army training centers or operate new ones for the conduct of basic and advanced individual training programs. Training Divisions at FORSCOM installations will provide training assistance to deploying units until they assume responsibility for the full basic or AIT mission. All of these divisions have recently undergone reorganization, which will temporarily restrict their effectiveness. Their capability should improve over the next few years.

These divisions will face severe training challenges. They must mobilize and train their own personnel. In some cases, their training experience can relate to current equipment like the M48A5 tank, but they must still train soldiers to man prestocked new equipment such as the XM-1. With mobilization and the influx of extremely large numbers of trainees, the instructor/student ratio can be expected to change drastically. The USAR Training Divisions will find it extremely difficult to provide the same high level of expertise and degree of personal attention which can be

provided in the peacetime training establishment and which may be required for successful training under the present system.

As a final consideration, the USAR schools are assigned to specific posts where they will augment the staff and faculty of service schools and training centers. These schools generally will be prepared for their mobilization mission since they perform similar functions during IDT and AT periods. An ongoing program, aimed at qualifying USAR instructors in the techniques of criterion-referenced instruction, will enable the USAR school personnel to continue with the present training approach. The USAR schools will participate in MOS training, officer branch courses, and Command and General Staff College instruction. Since they augment rather than replace Active Components in the training base, they can be expected to make significant contributions on the individual level.

Reserve Component unit capabilities are marginal, at best, to meet the training requirements of the "95% Battlefield." This limited capability is not necessarily the unit's fault. For example, the capability within the Army training system to conduct diagnostic testing to determine individual and collective training proficiency is extremely limited. The capability to employ training simulation devices is also limited by the general unavailability of these devices. Finally, there is limited capability to conduct training on ARTEPs or SMs because of material and equipment shortages. With these few examples in mind, it is obvious that many more limitations exist and, as a result, there are significant shortfalls which should be examined.

Alternatives for Bridging the Gap

In addressing alternatives to meet RC shortfalls, an analysis of the most efficient and effective means to structure the use of available training time, whether premobilization or postmobilization, begins with the determination of unit training proficiency and the level necessary for the unit to function effectively in combat. The Army requires a system whereby this determination can be made.[44] The ability to specify this "training gap" is critical, since it provides the basis for the necessary length and content of postmobilization training and indicates the essential level of premobilization training readiness. In the event of mobilization prior to implementation of such a system, the only option open for postmobilization training would appear to be prepared "lock-step" training packages. Assuming the unit's level of training readiness is known and specific needs can be identified, the key is to reduce the necessary training time to a minimum, or, stated another way, to compress the required training into the available time. This requirement demands that postmobilization training time not only be efficient in terms of the maximum increase in training proficiency for the time spent, but also that priorities will ensure that, as a minimum, critical combat skills are trained. Time is the critical resource, and its use must be carefully programmed during peacetime.

To discuss the problem of better organization and utilization of postmobilization training time, it will be helpful to introduce some definitions.[45] Time allotted to training on collective tasks is designated as T_A. This time can be subdivided further into two categories: T_{A1}, which is defined as conventionally-conducted collective training, using ranges, maneuver areas, etc.; and T_{A2}, which concentrates on the simulation of collective skills, making use of the latest training technology. Training on individual skills is defined as T_S. This also can be subdivided into two subelements: T_{S1}, individual training which requires a formal time allocation, and T_{S2}, which takes place on nonscheduled time, perhaps using self-instructional aids such as TEC.

Some training events mutually reinforce both individual and collective skills, in essence representing the integration between T_A and T_S. Such training represents a particularly efficient use of training time. Another aspect of using this integrated training is to take advantage of unprogrammed gaps in collective training time to work on individual skills. For example, a squad leader might conduct a class on first aid while waiting for transportation to return from a maneuver area.

There are two basic procedures for achieving maximum efficiency from integrated training. One is to be prepared to take advantage of time lapses by having training materials, like the so-called "hip pocket" lesson plans and TEC, readily available and their use planned, though not scheduled.[46] The second is to concentrate on essential ARTEP tasks, those collective events which are the most combat critical or which represent dense clustering of individual skills and subordinate unit tasks.

As a first step toward developing these key tasks, the US Army Training Board (ATB) has a project underway to relate individual Soldier's Manual tasks to collective ARTEP tasks. One result of this effort is to identify the areas of maximum clustering of individual skills. In addition, ATB was able to identify certain critical "terminal" individual tasks, which are tasks representing the culmination of several other tasks. By concentrating programmed individual training time on those tasks, maximum train-up on individual skills can be accomplished.

For the units, primarily combat support and combat service support, which deploy by D+30, there will be little training time available, perhaps even less than one-fourth of the available time. The time that is available will be largely consumed by preparing for deployment--loading equipment, taking shots, etc. Postmobilization training for these units will have to have certain characteristics. First, the training will have to take place at the unit's assembly area, port of embarkation, or in the combat theater itself. There will be very little time which can be devoted specifically to training. Second, training will have to be integrated into the unit's other deployment activities. It will be virtually impossible to block out periods of time specifically for training. Finally, unit leadership will be almost totally engaged with planning and

execution of the deployment itself, and will not be able to plan or carry out extensive training activities.

One means of addressing the challenges cited above is the intense use of exportable training packages. Such packages, using the latest training technology, could be constructed in a modular fashion and prestocked. The packages could be part of the unit's normal premobilization training program. The key to their utilization would be their assimilation into the unit's deployment activities, making maximum use of the integrated training and nonscheduled T_{S2} discussed earlier. Another alternative would be the establishment of learning-center-type facilities at the departure point, in the combat theater, or both. Incorporated into these training packages could be familiarization modules for new or unfamiliar types of equipment, as well as lessons designed to familiarize the individual with the theater to which the unit is being deployed. It would appear most effective to establish special units charged with responsibility for conducting such training rather than relying on the unit's leadership.

One approach for the special training organization could be referred to as a Variable Assistance Training Team (VATT). The Army operates on the principle that a unit's leaders should also be its trainers. This is a sound approach since preparation for the instruction greatly improves the knowledge and proficiency of the trainer. When a small unit's leader presents an effective unit of instruction, he is enhancing his position as the leader. When a leader controls practical work exercises, he exercises control according to his personality, molding the team and conditioning it to respond in a manner which suits his leadership style.

The success of this approach is dependent on the leader having the required technical knowledge or the time to obtain it through study. He must have time to prepare the instruction and enough knowledge of techniques of instruction to conduct effective training. There are Reserve Component units where the leaders have not yet acquired the appropriate technical knowledge. An example of a legitimate reason for this is the frequent organizational changes which beset Reserve Component units. When a unit is converted from Field Artillery to Military Police, it is unreasonable to expect the officers and NCOs to become proficient military policemen overnight. In other cases, instructional skills may be lacking. Although these skills should be developed, the members of an RC unit should not have all of their limited training time wasted by using them as training aids for OJT instructors. The RC time constraint places serious limitations on a unit's ability to solve these problems internally.

When leaders do not have technical proficiency, instructional expertise or time to prepare, leader-conducted training can be counterproductive. Leaders who display a lack of technical expertise lose rather than gain the respect of the unit. Poor instruction, that is, instruction in which students fail to learn, causes a loss of confidence within the

unit. Soldiers know when they are not proficient in their jobs. If they are not confident of their ability or the ability of the rest of the unit, the result is a breakdown in the personal and leadership readiness of the unit.[47] When this happens, the unit loses its "esprit" and winning attitude that accompanies the knowledge that it can do its job and do it well.

Units with these problems can be supported by VATT. The support would include specific training programs keyed to the unit's essential skills as defined perhaps by an annotated ARTEP to include course material, training support material, and instructors. They differ from the present concept of mobile training teams in their method of operation. Based on assessment of the unit's strengths and weaknesses, the unit commander and the chief of the VATT would determine the required training assistance. A unit with severe shortfalls might need the instruction conducted entirely by the members of the assistance team. It might even be necessary for the assistance team to coach the unit and its leaders through the initial conduct of practical exercises. Units which are more trained might request formal instruction from the assistance team with practical exercises conducted by the unit's leaders. At a more proficient stage, the RC unit's capabilities might require only that its leaders be coached through preparation of the instruction; but once coached, the unit could conduct the instruction itself.

The concept of variable assistance training provides a capability to rapidly build critical skills while permitting the unit to shoulder as much of the training load as it can handle, developing the total unit as rapidly as possible. These packets have application to both premobilization and postmobilization training environments.

These concepts are not new--many have been practiced by readiness groups with normal mission-oriented VATT formed by readiness group chiefs through cross-attachment of personnel within the readiness group based upon the needs of the particular RC unit. For example, if a FA unit requires FA, supply, administrative, and maintenance assistance, a team is formed to assist the unit in these areas. Other combinations are possible. An Infantry battalion might require only Armor and Field Artillery assistance in the employment of the combined arms team. A team could be formed for this mission. The assets of the Maneuver Training or Maneuver Area Commands might also contribute to these teams as required.

Courseware for training assistance packets could be extracted directly from "How to Train" or "How to Fight" material for critical tasks. In the maintenance area, a relatively new technique is the development of integrated technical documentation and training (ITDT) which takes advantage of the fact that for some skills as much as 80 percent of learning is accomplished by sight. Use of ITDT materials offers excellent potential for improving RC maintenance performance through its association of maintenance instructions in written form with action-oriented pictures of

the performance of the required steps. Training support material and simulators, which should otherwise be stockpiled at mobilization stations, could be used in the premobilization stage. This would avoid the pitfalls inherent in a stockpile situation, with incomplete or inoperable material which must be issued and refurnished before it can be used.

For units deploying at D+30 or later, there may be expanded training possibilities, although time will still be critical. This group includes a larger percentage of combat units than does the earlier deploying group. To the extent feasible, it would be beneficial to apply experiential learning techniques as this approach is demonstrating the capability to produce rapid results. By 1985, the Multiple Integrated Laser Engagement System (MILES) will be fielded, and would be suitable for this type of training for the combat arms. Training on the critical collective tasks can be incorporated with the engagement simulation to maximize the integration of individual and collective training. The problem of the location of training would have to be addressed, since MILES and other engagement simulations require maneuver space--although not excessive amounts. Ideally, the training should take place as near as possible to the units, so as not to interrupt their other deployment activities. While this will pose difficulties, it is possible that some potential training areas such as public park land could be made available. This, together with the continued effort to improve local training areas, should alleviate the problem in the future. For purely individual training, the discussion on exportable training above is appropriate. Were such learning centers and special units established, they would be available for follow-on forces as well.

A separate but related subject is the possibility of conducting leadership training during the postmobilization period. In order to train battalion and higher commanders and staffs, it is not necessary to have troops on the ground since supplemental techniques such as terrain walks and tactical exercises without troops (TEWT) may be used. Also available are the Computer-Assisted Map Maneuver System (CAMMS) and similar war games which serve to develop tactical readiness skills. If needed, these could be incorporated into postmobilization training. They could be run concurrently with troop training on MILES or individual exportable training packages.

The structure of the premobilization and postmobilization training programs are intimately related. As pointed out earlier, after mobilization, time will be extremely limited. The training that can be addressed in the postmobilization period is limited to refresher type training or initial training for skills with extremely short acquisition periods. Long lead-time skills, such as tactical readiness and complex procedural skills, can be refreshed during postmobilization, but they must be taught during premobilization. The ultimate aim of the premobilization training program is to maintain a state of training readiness such that the unit is able to reach combat proficiency with only minimal postmobilization training.

To enhance the level of steady-state training readiness that a unit can achieve, three variables warrant consideration: (1) better utilization of training time, (2) reconfiguration of the 38 annual training days, and (3) reduction of individual and collective tasks in which RC units are expected to maintain proficiency.

The use of focused exportable training packages to derive the maximum benefit from training time is as appropriate for steady-state premobilization training as it is during postmobilization. Training on critical tasks, with periodic diagnostic testing, represents a structured means to maintain training proficiency. As an adjunct to this training, it is desirable, perhaps even necessary, to transport the RC unit to an Active installation periodically. For the combat arms units this provides the use of training areas, ranges, MILES, etc. It is possible that with careful planning, combat support and combat service support units could get some realistic training as well; e.g., a GS maintenance unit working at the post maintenance facility would have a much wider range of equipment to work on than at home station.

It is possible that for some type units and individuals, there are more efficient distributions of the 38 training days per year. For instance, consideration might be given to a 3-week AT, with the first week spent on intensive training on individual skills, followed by 2 weeks of collective training. This would provide for deeper reinforcement of skills as well as better proration of the inevitable time lost in packing and unpacking. During the remainder of the year, training time would focus on skill maintenance training and administration (immumizations, POR qualifications, etc.).[48] This is one example; alternatively, for someone with highly complex individual skill requirements, which may decay rapidly, it may be necessary to redistribute the training time in smaller portions throughout the year.[49]

This leads to examination of the skills which are appropriate for maintaining proficiency in the Reserve Components. Virtually all skills require periodic retraining; complex procedural skills, which are becoming more common in the Army as new equipment is introduced, are forgotten immediately if not practiced frequently. An exception to this situation would be a reservist whose civilian job provides sufficient reinforcement for his military skill; e.g., a mechanic or equipment repairman. Careful analysis is required to determine if certain skills can be retained more easily in the RC due to their civilian job association and, of equal importance, to identify those which cannot be maintained.

Although little is known at present about the length of time necessary to train up to proficiency on collective tasks, or the frequency of retraining required to sustain proficiency, the ARTS pilot tests in 1978, and the more detailed follow-on tests, should provide useful insights. Discussions in the past of training proficiency in the Reserve Components have generally centered around determining the highest organizational level at which reserve units can train to proficiency. While

this approach may be easier to manage, it does not address the specific mission or the unique characteristics of the reserve units. Additionally, it may not acknowledge adequately current educational technology.

Another approach to this problem may be found in specifying the unit's mobilization mission and the collective tasks required to accomplish that mission. Once the specific tasks are identified at each organizational level, those tasks which can be trained to proficiency in the premobilization environment can be determined. This determination would be based on learning and decay curves, and frequency of retraining requirements. While these curves are being developed, experience and common sense would dictate that there will be tasks ranging from crew to battalion level upon which the RC units can train to proficiency in the premobilization environment. Likewise, there will be tasks which cannot be trained to proficiency until after mobilization because of complexity or rapid decay. These postmobilization tasks can be further subdivided into those which can be trained up rapidly through a modular training package, such as the M60A1 modular tank training program, and those which are extremely complex and require a long train-up period, such as the Pershing programmer test station operator. The collective tasks requiring long train-up probably should be maintained in the Active Components only.

Schematically, this comparison of levels of training proficiency can be illustrated as follows:

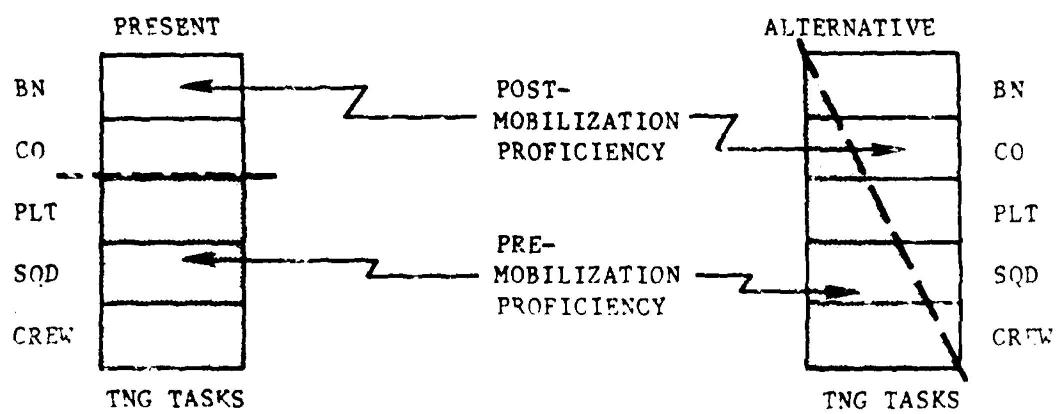

Figure 3-2. Level of Training Proficiency Pre and Postmobilization

As an example of those tasks which can be trained-up rapidly, the M60A1 modular tank training program currently being tested gives indications of providing a tank crew capable of fighting a tank to the required standards and conditions after a brief train-up period. On the other

hand, the Pershing program test station operator currently undergoes initial training of 12 weeks duration and requires about 20 hours per week in system operation and organizational maintenance to maintain his proficiency.

The organizational level of the unit does not necessarily correlate with the level of proficiency. Rather, the level of proficiency in individual and collective tasks is more closely related to the specific task being considered and its learning and decay rates.

The IRR presents a particularly difficult challenge. The individuals in the IRR are planned for use as individual replacements in both AC and RC units. At present there is a severe MOS mismatch as well as shortage of these personnel. They will be integrated into units with virtually no formal training time. This leads to a requirement to integrate postmobilization training into the personnel processing system. It may be appropriate to augment the theater replacement organization with a VATT or the like to provide the train-up and cross-train required. One advantage of having the training in the theater is that it could be made specific to the individual's assignment. It may also be necessary to institute some sort of periodic diagnostic testing of the IRR personnel, similar to the SQT.

Summary

Throughout this chapter, emphasis has been given primarily to ideas which have developed through the use of a total training analysis methodology as it applies to Reserve Component training. Based upon this methodology, a review is made of the requirements, capabilities, and shortfalls which face the RC commander in the accomplishment of his pre-mobilization and postmobilization training mission. Special requirements are outlined, such as State requirements for National Guard units, professional competence and leadership training for key personnel, and training base requirements for Training Divisions, USAR schools, and IRR replacements. The chapter concludes with a discussion of alternatives for bridging the gap between RC requirements and capabilities.

The goal for an effective, efficient and justifiable RC training system for 1985 is complex and presents many challenges. Some of the solutions leading to the attainment of this goal are within our current grasp, while others require more study. Further refinement of the total training analysis methodology should generate innovative solutions and ideas across the entire spectrum of RC training with particular attention to lessons learned from previous mobilizations. The expected contribution of the Army National Guard and Army Reserve to the Total Force warrants attack of these challenges now.

FOOTNOTES

[1]Marvin A. Kreidberg and Merton G. Henry, History of Military Mobilization in the United States Army, 1775-1945, p. 609.

[2]Ibid., p. 610.

[3]HQ Army Ground Force, Army Ground Force, Army Ground Force Test, August 1964, p. 1.

[4]Irving Heymont and E. W. McGregor, Review and Analysis of Recent Mobilizations and Deployments of US Army Reserve Components, p. 1-2.

[5]Kriedberg and Henry, p. 3.

[6]US Department of the Army, Army Environment, 1985-1995, Report of the Department of the Army Study Group, p. 65. (This study is classified SECRET but data extracted is UNCLASSIFIED).

[7]Kent R. Greenfield, Robert R. Palmer, and Bell I. Wiley, "The Organization of Ground Combat Troops, United States Army in World War II," as quoted in Heymont and McGregor, p. 2-7.

[8]Heymont and McGregor, p. 2-10; Kreidberg and Henry, p. 604; US Department of the Army, Training and Doctrine Command, Brief Survey of the US Army Experience in Mobilization and Training, p. 32.

[9]Heymont and McGregor, p. 3-13.

[10]Heymont and McGregor, p. 4-10.

[11]John I. Wright, "Concerning the Selected Reserve Forces," p. 1.

[12]Heymont and McGregor, p. 2-9.

[13]LTC James B. Fleming, NG LNO, interview, Fort Belvoir, VA.

[14]US Department of the Army, Pacific, Office of the Deputy Chief of Staff for Operations, "The 29th Infantry Brigade (Separate) - 1 January 1968 through 30 June 1970," p. 34-41, as quoted in Heymont and McGregor, p. 5-12 and 5-13.

[15]Wallace C. Magathan, et al, Tailoring of Reserve Component Unit Training Assemblies and Unit Manning Levels, p. 6.

[16]Heymont and McGregor, p. 2-9.

[17]US Department of Defense, Program Analysis and Evaluation Directorate Memorandum for Record, Data on Turbulence in Army Reserve Component Affiliated and Nonaffiliated Units, p. 1.

[18]Heymont and McGregor, p. 2-9.

[19]George H. Gray, What Are US Reserve Forces Really For? p. 10.

[20]Heymont and Mcgregor, p. 1-11.

[21]AR 10-5, para 2-25 and para 2-38.

[22]US Department of the Army, Program Analysis and Evaluation Directorate Briefing, The Total Army in Perspective, p. 4.

[23]US Department of the Army, Training and Doctrine Command Letter, Post Mobilization Individual Training and Support Plan (Short Title: TRADOC-PMITSP).

[24]US Department of the Army, Training and Doctrine Command, The USAR School, Yesterday - Today - Tomorrow (June 1977), pp. 1-2.

[25]Doris C. Berger, John R. Chiorini and Victor W. Hobson, IRR Preassignment Test Baseline Data Collection and Analysis, pp. 1-1, 2-15.

[26]US Department of Defense, The Guard and Reserve in the Total Force, pp. 17-18.

[27]US Department of the Army, Sixth United States Army, Something-for-Nothing Study, p. 1.

[28]Ibid. Surveys conducted as part of the Something-for-Nothing Study indicated that commanders and technicians spent as much as 85 percent of the available training time on other than mission-related training.

[29]US Department of Defense, Program Analysis and Evaluation, Memorandum for Record: Data on Turbulence in Army Reserve Component Affiliated and Nonaffiliated Units, p. 8 and message, dated 161739Z January 1978. US Department of the Army, Army Readiness Region IX, RC Training Concept and Objectives, p. 1.

[30]George Paxson and LTC E. R. Remiszewski, interview. LTC Remiszewski is Chief, School Branch, Operation and Training Division, National Guard Bureau and Mr. Paxson is Senior Operations Analyst, Operations and Logistics Division, OCAR.

[31]US Department of the Army, Deputy Chief of Staff for Operations Directorate of Operations and Readiness, Information Paper, subject: ARTEP Improvement, p. 1.

[32]Roy A. Werner, "The Other Military: Are US Reserve Forces Viable?" Military Review, p. 32.

[33]US Department of Army, Forces Command, FORSCOM Form 1R/2R, Reports of Yearly Training Evaluations of RC Units, for CY 1977.

[34]State highway restrictions usually prohibit the movement of oversize loads on weekends. Most WETS do not have secure storage areas. If a secure area exists, then the equipment can be moved but Army Tactical carriers apparently exceed even the overweight restrictions and commercial carriers must be used.

[35]US Department of the Army, Training and Doctrine Command, Letter of Instruction (LOI) for the Pilot Program to Implement Self-Paced Instruction in USAR Schools.

[36]US Department of the Army, 7th Infantry Division, Letter, Commander's Bayonet Guidance (CBG) No 23 Planning and Conducting Training at Company Level, p. 4. Also see MAJ Clarke M. Gillespie, Unit Training Programs, chapter III.

[37]The technician force within an RC battalion varies slightly but generally consists of (1) the Command Administrative Assistant (CAA), normally the senior member of the technical team; (2) the senior administrative assistant (SAA); (3) the staff training assistant (STA); and (4) the company administration and supply technicians (AST) (1 per company). For a more detailed discussion of these personnel see TC 21-5-7, p. 139.

[38]US Department of Army, Army Readiness Region V, SOCATS After Action Report (1976-1977).

[39]US Department of Army, Deputy Chief of Staff for Personnel Memorandum, Militia Careers Program (MCP) Pilot Test--DECISION MEMORANDUM.

[40]US Department of the Army, Reserve Components Personnel and Administration Center Letter, Officer and Enlisted Personnel Management--USAR p. 1.

[41]Estimates of available training time are based upon various discussions with members of the RC community, both field and staff.

[42]MAJ Clarke M. Gillespie, Unit Training Programs, Army Training Study Concept Paper, chapter IV.

[43]MAJ David S. Blodgett, Training Proficiency, Readiness and Combat Effectiveness, Army Training Study Concept Paper, chapter VI.

[44]US Department of the Army, Training and Doctrine Command, ARTS Training Effectiveness Analysis Concept Package, p. B-1.

[45] Gillespie, chapter IV.

[46] *Ibid*., chapter III.

[47] Blodgett, chapter VI.

[48] The recommendation that 3-week AT be considered is recognized as a major change to existing policies and traditions. It would, for example, require an extension of the traditional 2-week vacation period for those citizen soldiers who attend AT during their vacations.

[49] LTC William B. Valen, *The Sustainment of Training Proficiency*, Army Training Study Concept Paper, chapter II.

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